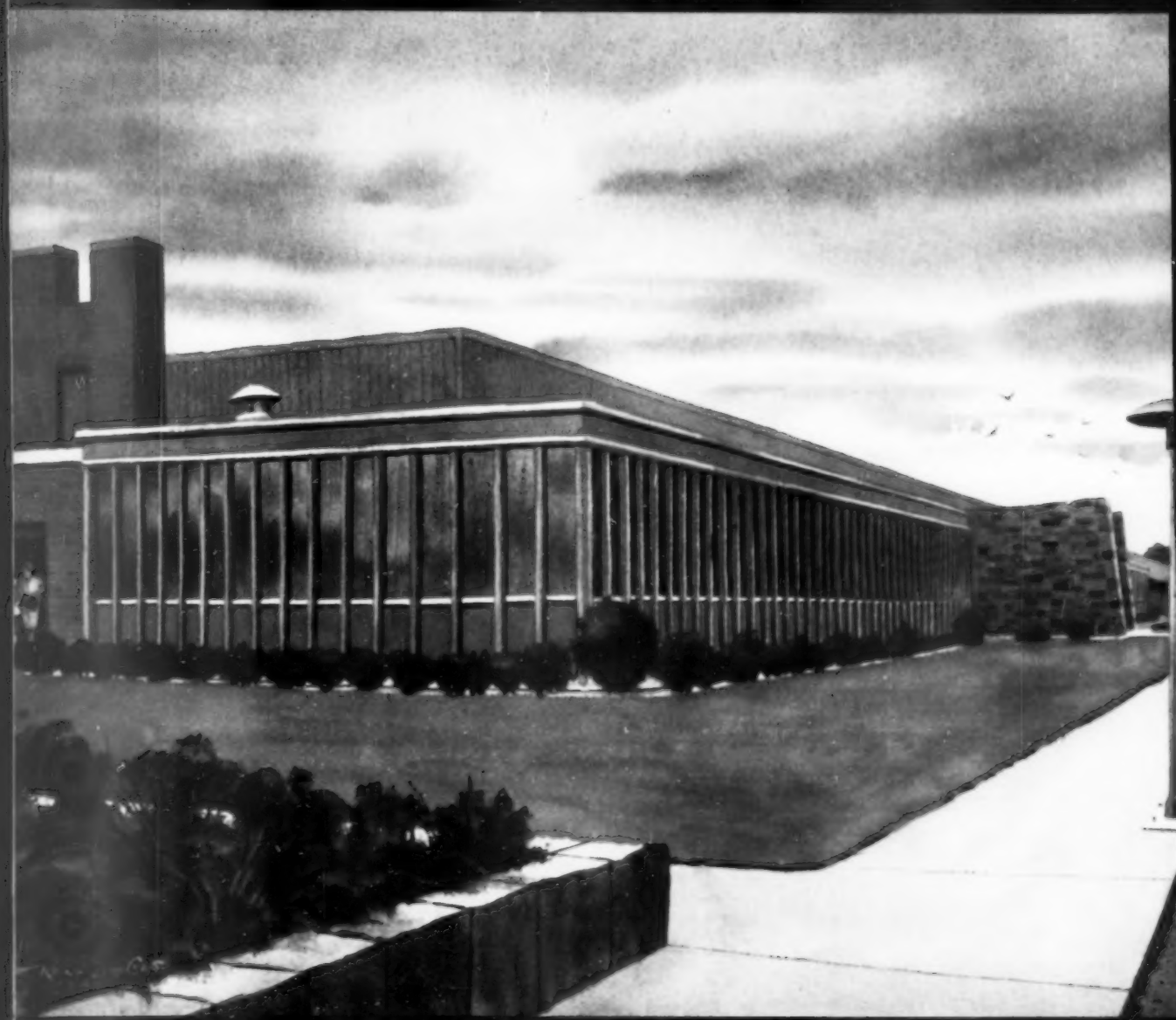
FACTORY

BETTER PRODUCTION AND MAINTENANCE THROUGH BETTER MANAGEMENT



Watercolor painting: Rural setting marks Hoover Ball & Bearing Company's new plant, Ann Arbor, Mich.

JULY 1959

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION

TO MECHANIZE—OR NOT? . . . p. 62

Better ways to solve this make-or-break problem

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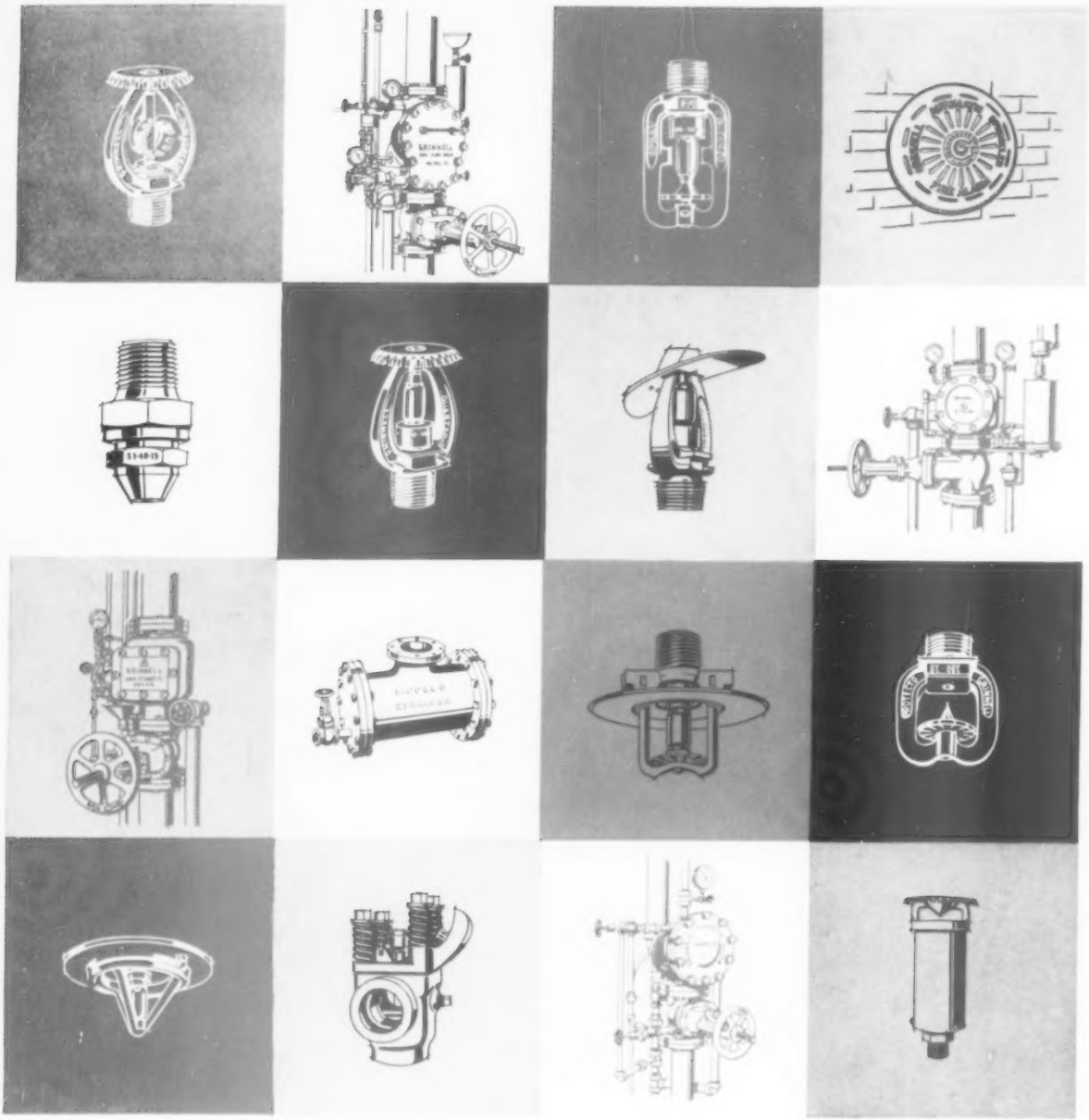
THE TRUTH ABOUT CONTRACT MAINTENANCE . . . . . p. 170



the best fire protection money can buy!

Most people think that all automatic sprinkler systems are much the same... but nothing could be further from the truth. They vary in durability, reliability and the speed with which they apply water to the fire. ✓ ✓ ✓ During the past 89 years of research and development Grinnell has invented and perfected sprinkler heads, nozzles, projectors, release devices, alarms, valves and other components for practically every conceivable need. When these are incorporated into fire protection systems executed in accord with Grinnell research and experience, engineered to **your** special needs, fabricated in Grinnell shops, and installed by expert Grinnell erection crews... you have protection which no ordinary sprinkler system can match. Let Grinnell recommend the best system for you. Write Grinnell Company, Inc., Providence 1, R.I., or to the Grinnell Fire Protection office near you.

FIRE PROTECTION SYSTEMS SINCE 1870 GRINNELL

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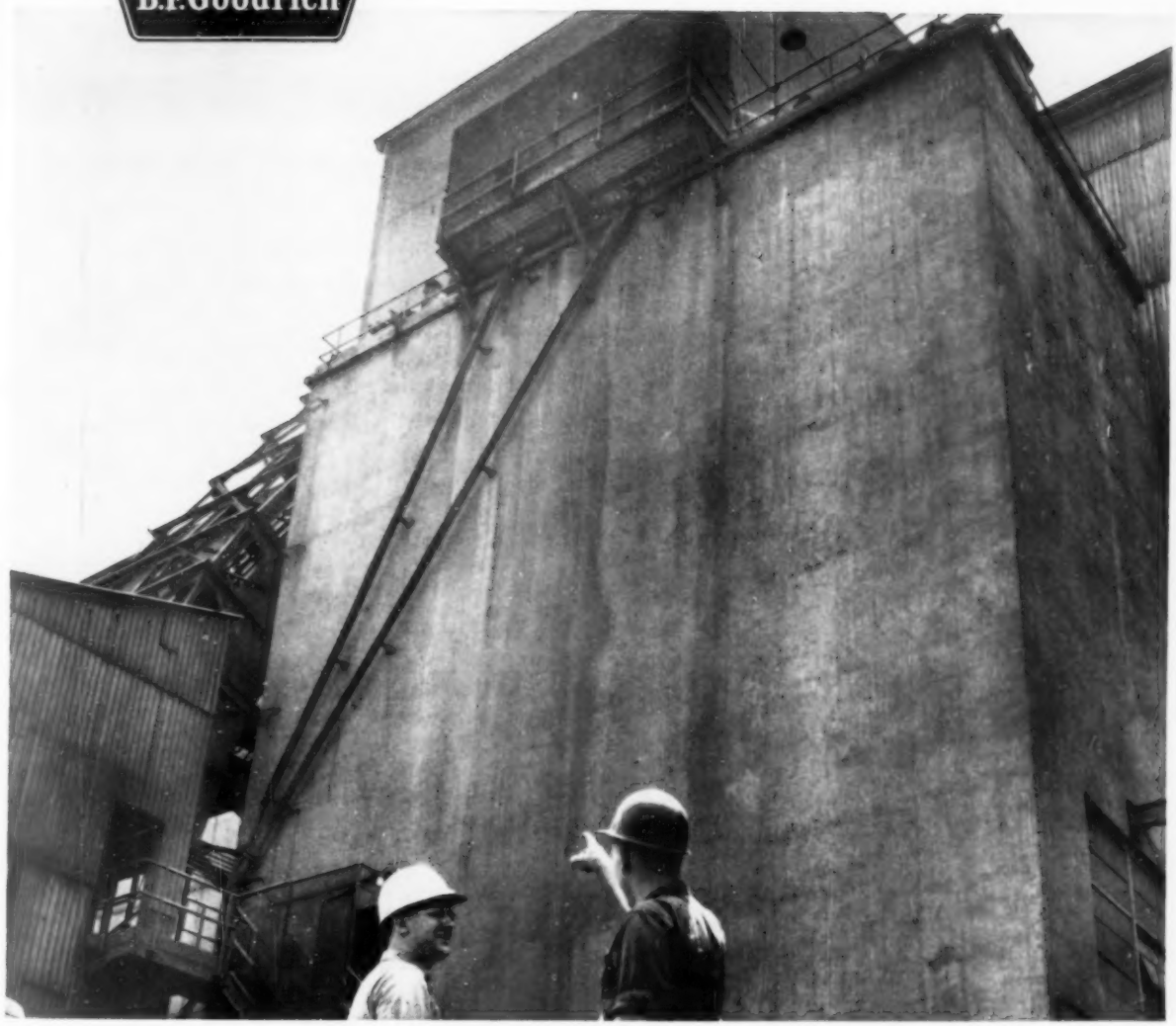
B.F.Goodrich



Hose outlasted pipe 7½ years

B.F.Goodrich improvements in rubber brought extra savings

THE tubes going down that wall aren't metal pipes but hose. A mixture of fly ash and acid water with sharp slivers of metal in it had been eating holes in pipe within six months. Each pipe replacement cost $700 plus about 100 hours of workers' time.

Then B.F.Goodrich hose was put on the job, had been there 8 years when the picture was taken. This is a kind of hose with a lining so tough it has been used in some places to handle broken glass and granite chips.

Smart plant engineers and purchasing men, working with a B.F.Goodrich distributor, had decided to try this special hose instead of pipe. By lasting 7½ years longer than pipe, they now figure that the B.F.Goodrich hose had saved $6400 in replacement costs and $4800 worth of maintenance time.

The hose is at a steel company's power plant. It gulps thousands of gallons of water and grit every day but shows no sign of wear, looks good for many years more.

Your B.F.Goodrich distributor has exact specifications for the B.F.Goodrich hose described here. And, as a factory-trained specialist in rubber products, he can answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Dept. M-571, Akron 18, Ohio.*

B.F.Goodrich ***industrial rubber products***

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THE MAGAZINE OF PLANT OPERATING MANAGEMENT

Edited exclusively for the men with management responsibility for production and maintenance in the manufacturing industries

PROBLEM-SOLVING GUIDE

THIS SIMPLE FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve current operating problems. Here's how it works:

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- 1.1 Management and Practices
- 1.2 Buildings and Yards
- 1.3 Services and Facilities
- 1.4 Electrical Services

2.0 Production
- 2.1 Management
- 2.2 Production Controls and Systems
- 2.3 Methods and Technology
- 2.4 Material Handling and Plant Layout

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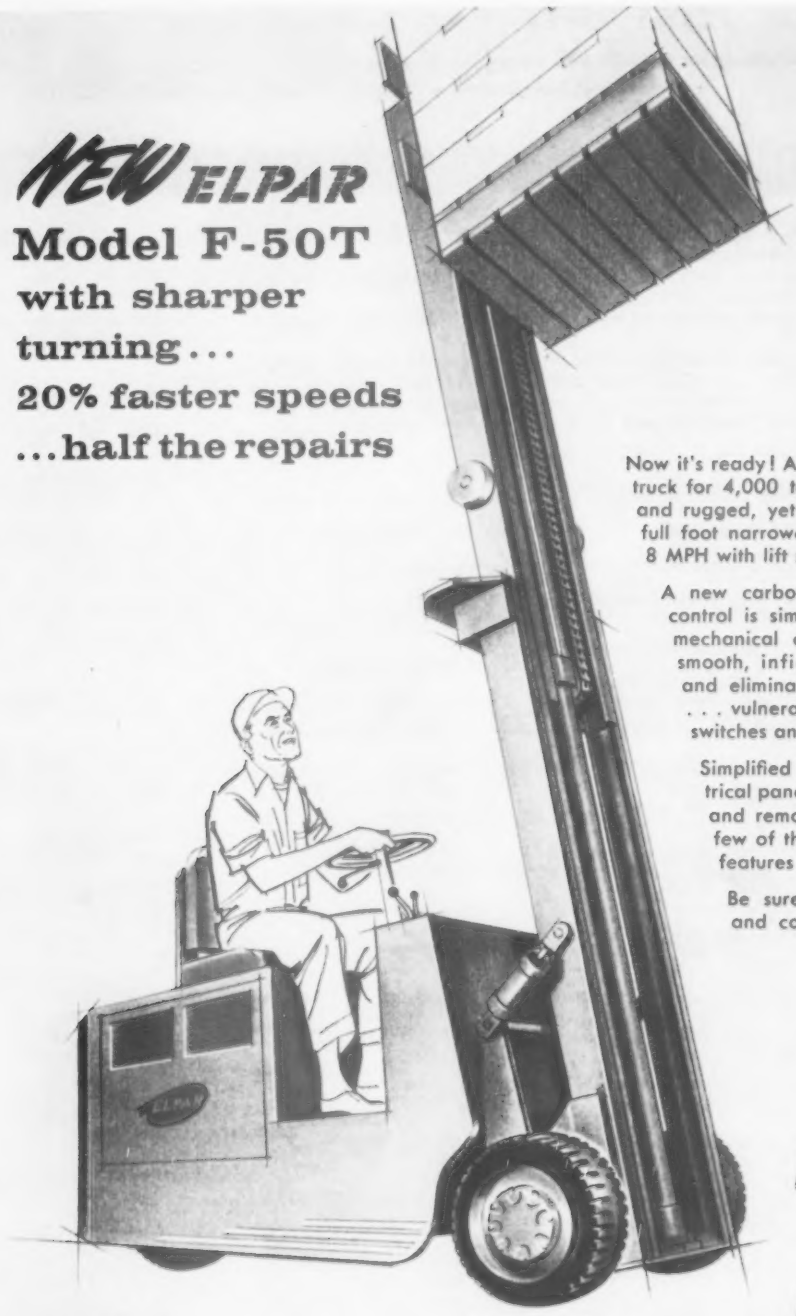
NEW ELPAR Model F-50T

with sharper turning... 20% faster speeds ...half the repairs

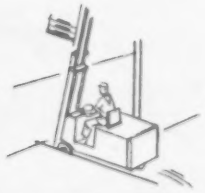


Now it's ready! An all new ELPAR electric fork truck for 4,000 to 6,000 lb. loads. It's tough and rugged, yet it will stack from an aisle a full foot narrower than before. Top speed is 8 MPH with lift speeds to 60 FPM.

A new carbon pile Acro-Smooth speed control is simplicity itself. Using a simple mechanical control linkage, it provides smooth, infinitely variable travel speeds and eliminates major maintenance items . . . vulnerable speed contactors, master switches and resistance boxes.

Simplified hydraulics; removable electrical panel; center-sill unit construction; and removable dash board are just a few of the many "easy maintenance" features on the new F-50T.

Be sure you check its convenience and cost cutting potential yourself.



More maneuverable in tight spots

Faster lift and travel speeds

MODEL F-50T-
4,000 TO 6,000 LB. CAPACITY

Write for further information on the F-50T . . . today!

ELPAR
ELECTRIC TRUCKS

THE **ELWELL-PARKER** ELECTRIC COMPANY
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TWICE THE LIFE... ONE-THIRD THE OPERATING COST

For more facts Circle 449 on Reader Service Card

ANOTHER **GOODYEAR DISTRIBUTOR** FOLLOWS THROUGH!

Extends slurry-line life by 24 times

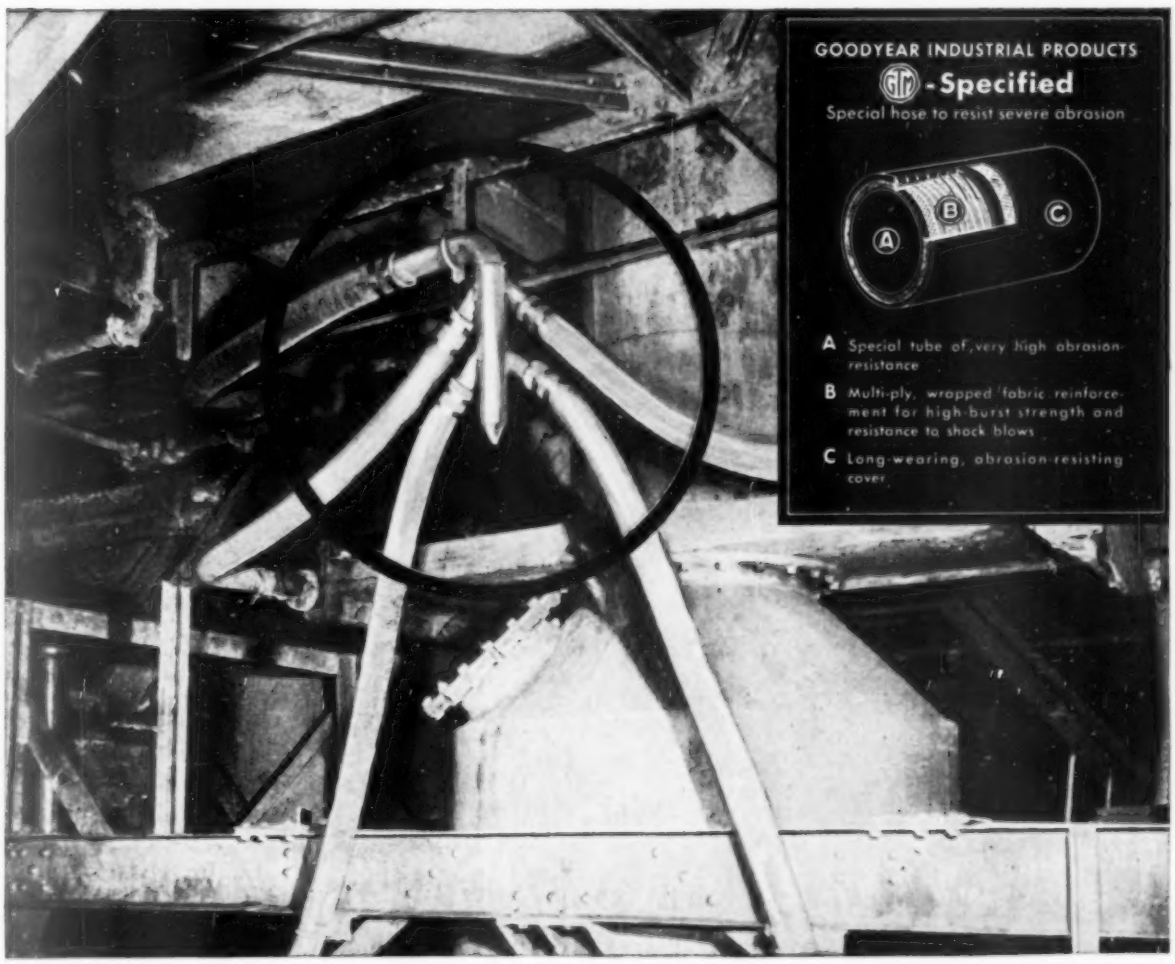
A Goodyear Distributor and a G.T.M. – Goodyear Technical Man – are quite a team. When they get together, tough problems fade – fast.

Take the trouble with the coal-dust slurry line at this Pennsylvania coal-cleaning plant. Even the heaviest steel pipe was quickly eaten through. In fact, 71 days was the longest service. Then there'd be another shutdown – another expensive replacement.

But that was before the Goodyear Distributor-G.T.M. team took over. Their suggestion: a special abrasion-fighting hose, engineered for just such operations. Result: that hose has done the job for more than 4 years at last report – has outperformed the heavy pipe 24 times over.

And that's typical. Time after time – in plant after plant – the Goodyear team has proved that years of trouble-free service is only a matter of the *right* recommendation of the *right* industrial product.

So next time you have a profit-eating situation like this, check it with your Goodyear Distributor and his G.T.M. You'll find them listed under "Rubber Products" or "Rubber Goods" in the Yellow Pages. Or you can write Goodyear, Industrial Products Division, Akron 16, Ohio.


GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
Special hose to resist severe abrasion
A
B
C
A Special tube of very high abrasion-resistance
B Multi-ply, wrapped fabric reinforcement for high-burst strength and resistance to shock blows
C Long-wearing, abrasion-resisting cover

GOODYEAR

THE GREATEST NAME IN RUBBER

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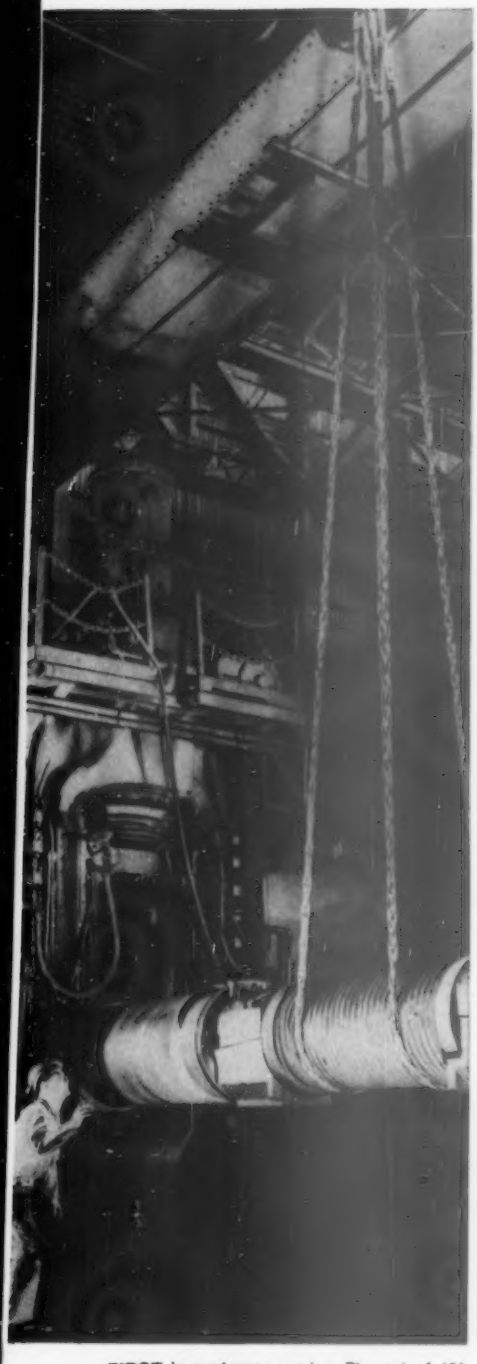
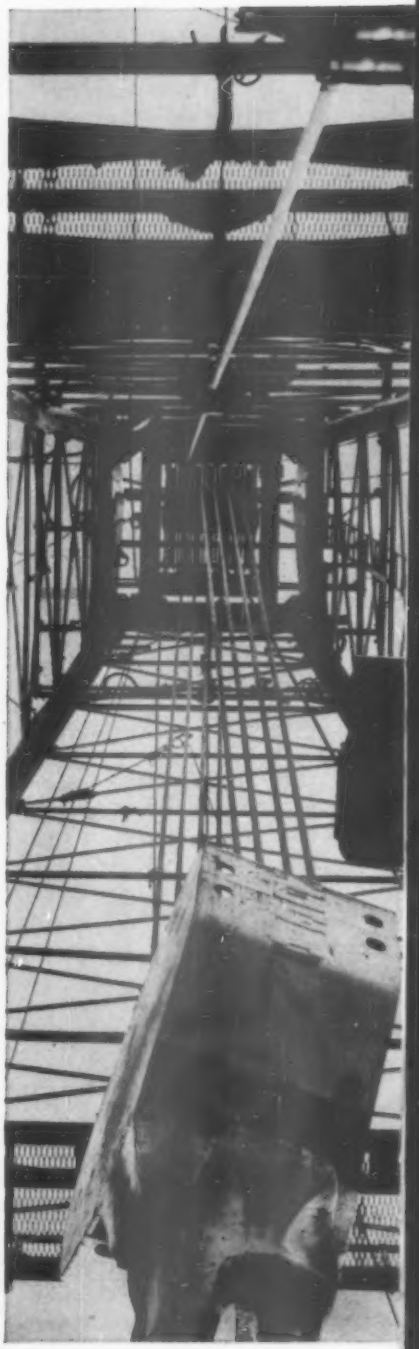
In field after field—FIRST with

SAFETY IN



FIRST in customer service. The set of J&L braided slings, shown here with a 70-ton lift, has been in service for 5 years. Recommended by a J&L wire rope engineer, the set replaced slings that had to be renewed every 30 days.

FIRST and still exclusive producer of Centerfit, the strongest standard wire rope ever manufactured. Centerfit was designed by J&L to reduce costs and provide increased safety in the mining and construction fields.



FIRST in the development of new types of wire rope. To reduce oil well drilling costs, J&L designed SpringKore for deep well rotary drilling . . . and PlastiKore to help increase cable tool life in oil and water well drilling.

LIFTING!

J&L wire ropes and assemblies

FIRST—because J&L research and development have pioneered many new wire rope constructions and assemblies which have provided increased safety and better service for customers of J&L.

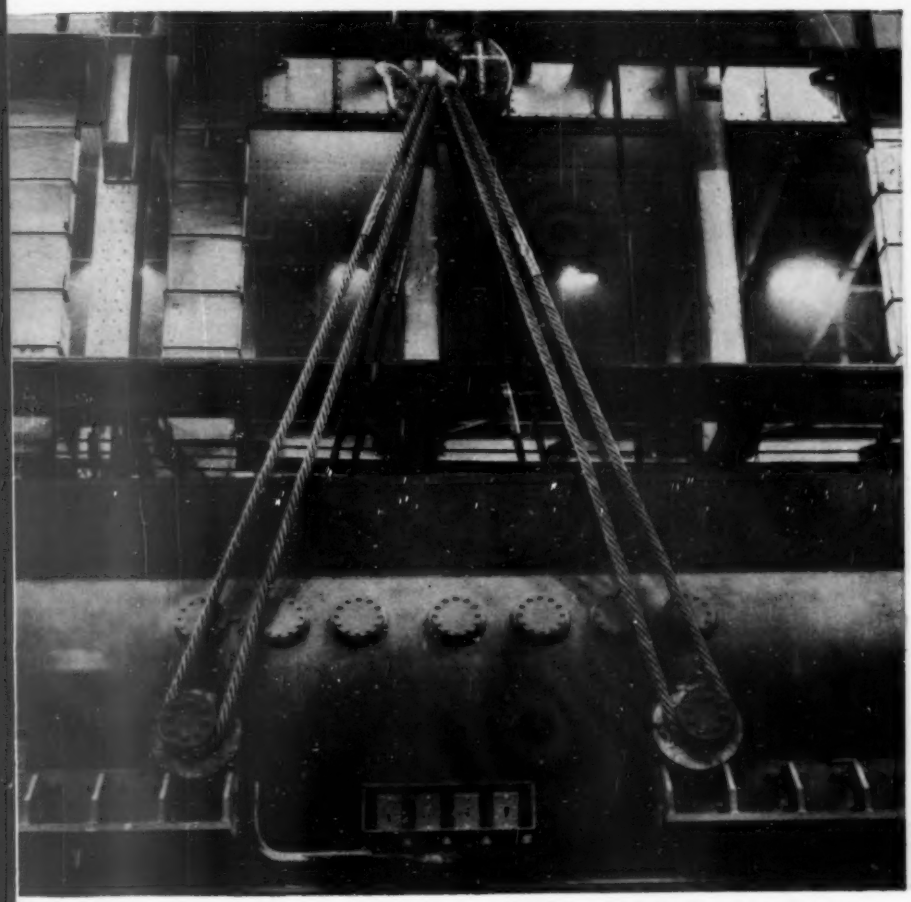
FIRST—because J&L is an integrated producer and is able to control quality from iron ore to finished product. *And*, because every wire, every wire rope and every J&L assembly is thoroughly tested before and after fabrication.

FIRST—because J&L brings to industry the J&L "Safety in Lifting" school which provides in-plant classes and demonstrations to help industry reduce lifting hazards and operating costs.

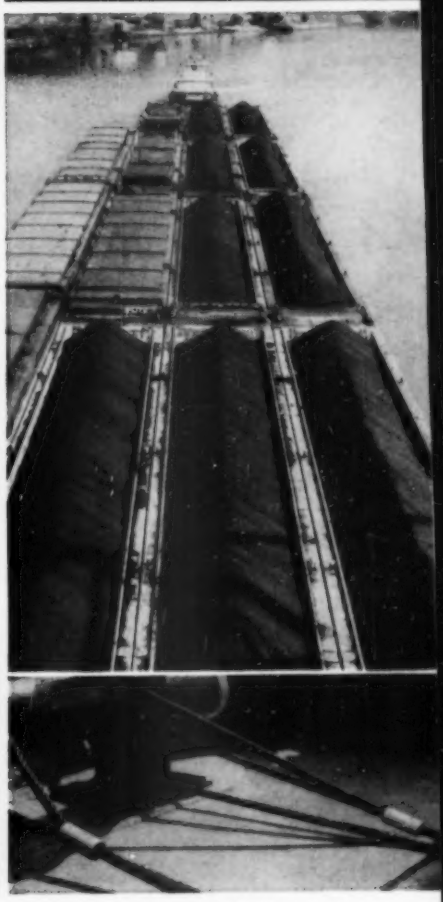
FIRST—because over 300 J&L wire rope distributors and 16 J&L wire rope warehouses across the nation are equipped to provide the best service and delivery of wire rope, manila, and proof-tested wire rope assemblies.

Jones & Laughlin Steel Corporation

WIRE ROPE DIVISION • MUNCY, PENNSYLVANIA

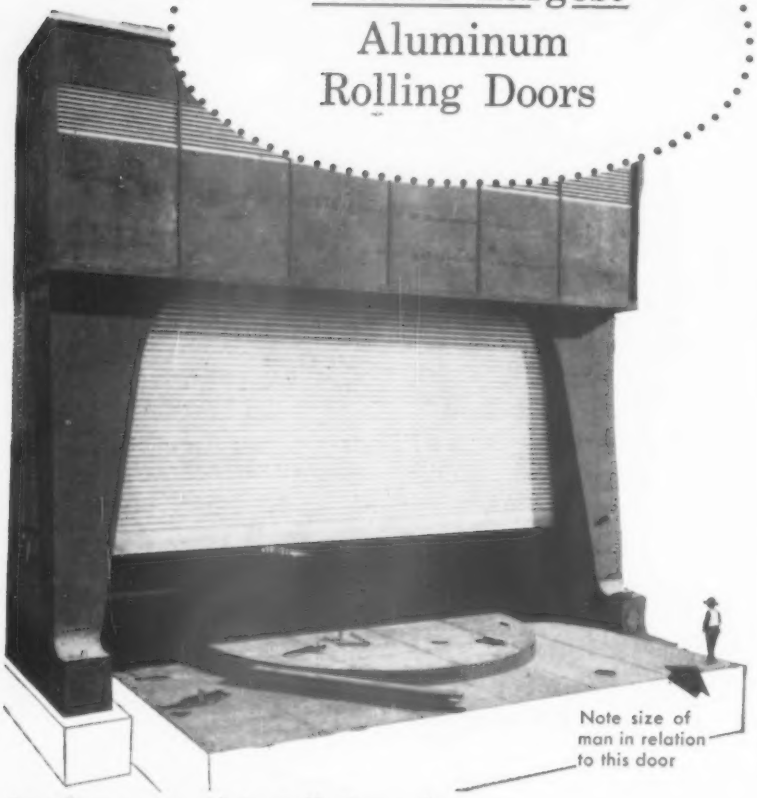


FIRST in engineering the special jobs. Two cable laid grommets, fabricated from J&L's exclusive Centerfit wire rope, are designed to lift a huge 308-ton steam turbine which is valued at approximately two million dollars.



FIRST in the development of new-type assemblies. J&L JalKlamp fittings are presently used by 80 percent of all large barge operators on the inland waterways because JalKlamp assemblies provide greater safety and efficiency.

World's Largest
Aluminum
Rolling Doors



Another unusual installation of

KINNEAR Rolling Doors

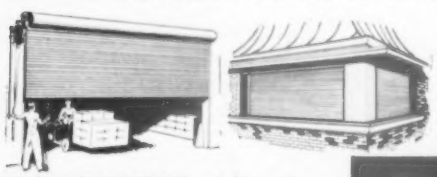
In 60 years of making metal rolling doors for industrial and commercial openings of every kind, we believe these are the largest ever made of aluminum.

Two doors 48 ft. wide and 39 ft. high enclose opposite ends of this 300-ton traveling gantry crane at the Robert H. Saunders — St. Lawrence generating station of the Hydro Electric Power Commission of Ontario. Similar Kinnear doors are used in New York's Robert H. Moses Power Plant, also part of the St. Lawrence project.

The doors are opened electrically as the crane is positioned over one of several open hatches in the generating station . . . then closed to permit working inside in any weather.

The space-saving efficiency and all-metal protection of Kinnear Rolling Doors cut costs in all kinds of openings — from counter-top areas to large industrial service doorways, as shown in the sketches below.

Every Kinnear Rolling Door is also REGISTERED — full details and drawings are kept in Kinnear's own fireproof vaults. *Your Kinnear doors are never obsolete, even if they serve for half a century or more — as many Kinnear doors have.*



Kinnear Rolling Doors are built any size, of steel, aluminum or other metals. Motor operation, with push-button control, if desired. Write for full details.

The KINNEAR Mfg. Co.
FACTORIES:
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KINNEAR
ROLLING DOORS
Saving Ways in Doorways

FACTORY LETTERS

WAGE INCENTIVES

Sir:

We were particularly interested in "The Truth About Wage Incentives and Work Measurement Today" (FACTORY, April, page 74). In the indirect labor work measurement field we would greatly appreciate any information you may be able to supply about the plants participating in this survey. A list of plant names, locations, and industries would be of great help.

J. S. Townsend
Supervisor, Manufacturing
Engineering Dept.
Accessory Division, Ford Motor Co.
Ypsilanti, Mich.

Sir:

Your survey article "Wage Incentive and Work Measurement," April issue, page 74, is excellent. May we please have ten copies?

E. A. Troutman
Industrial Engineer
Ingersoll-Rand Co.
Phillipsburg, N. J.

Sir:

Thank you for the Survey of Work Measurement and Wage Incentive Practices published in FACTORY.

We have analyzed the survey results and many summary comments pertinent to our own organization. It is our intent to review the survey and obtain comments from those persons in our organization with

Turn the page

FACTORY

July 1959 Vol. 117, No. 7

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Motorola 2-way radio users

INCREASE THE PRODUCTIVITY

of industrial vehicles

34%*

*** Operating records of 45 typical companies prove that 2-way radio increases productive operating hours per day of each vehicle from 5.3 to7.1 —a gain of nearly 2 HOURS A DAY!**

One of the men surveyed put it this way: "Without radio, we would require many more vehicles and men to carry on our present operations."

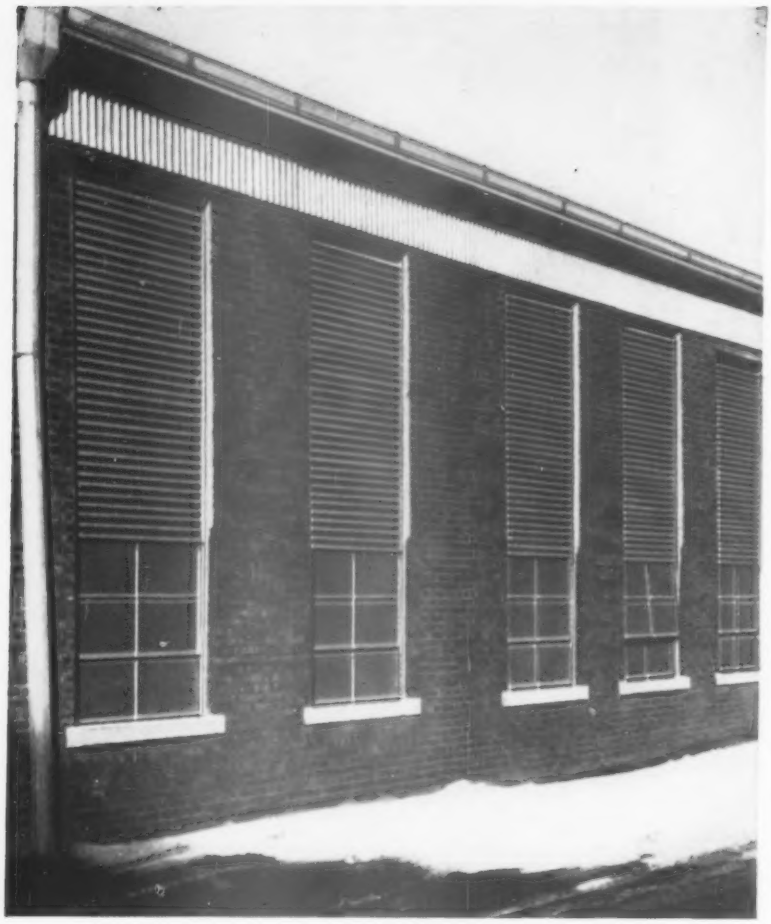
In plants of all sizes, Motorola 2-way radio enables drivers and machines to increase their productivity. Radio links materials handling vehicles both inside and outside the plant with one central dispatcher . . . helping move *more* materials *faster*, and getting them where they're needed *on time*.

No matter what vehicles your business uses—a fork lift truck, a supervisory car, or a 10 ton truck— you, too, can profit from Motorola 2-way radio. It's simple to obtain your Motorola mobile radio system; all details are handled for you. Motorola's complete 2-way radio "package"—systems engineering, financing, installation and maintenance—assures you of the finest communications system, designed to fit your needs. Get the proof—write today for your Motorola case history portfolio.

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., A Subsidiary of Motorola Inc., 4501 Augusta Blvd., Chicago 51, Illinois

For more facts Circle 453 on Reader Service Card



No more broken windows...

Rockwell has glazed with Structoglas

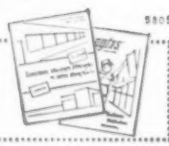
Structoglas is *shatterproof reinforced plastic*—made from a specially developed durable resin to withstand shock, impact, vibration—eliminate glass breakage. Structoglas is *tinted* to filter and diffuse sunlight. Tiring glare is gone—without special painting. And Structoglas is *easily installed* with ordinary glazing methods.

What about your plant? You can let in plenty of free natural daylight and end broken windows, too. Glaze *once and for all* with Structoglas.

structoglas®
reinforced plastic panels

5109

WRITE TODAY for new Structoglas Glazing Folder, Firestone and Rockwell Case Histories. Structoglas Division of International Molded Plastics, Inc., Dept. F-7 Cleveland 9, Ohio.



responsibilities in the area of work measurement and premium payment. We feel that this survey will strengthen some of our convictions and aid in future planning. This subject is most interesting and dynamic. There will always be significant challenges that will bear constant attention from all levels.

H. L. Miller
Manager, Wage Administration
Eastman Kodak Co.
Rochester 4, N. Y.

Sir:

I enjoyed your survey on Wage Incentives and Work Measurement. It certainly contains many facts which can be used as a yardstick to measure the results of any company's incentive program.

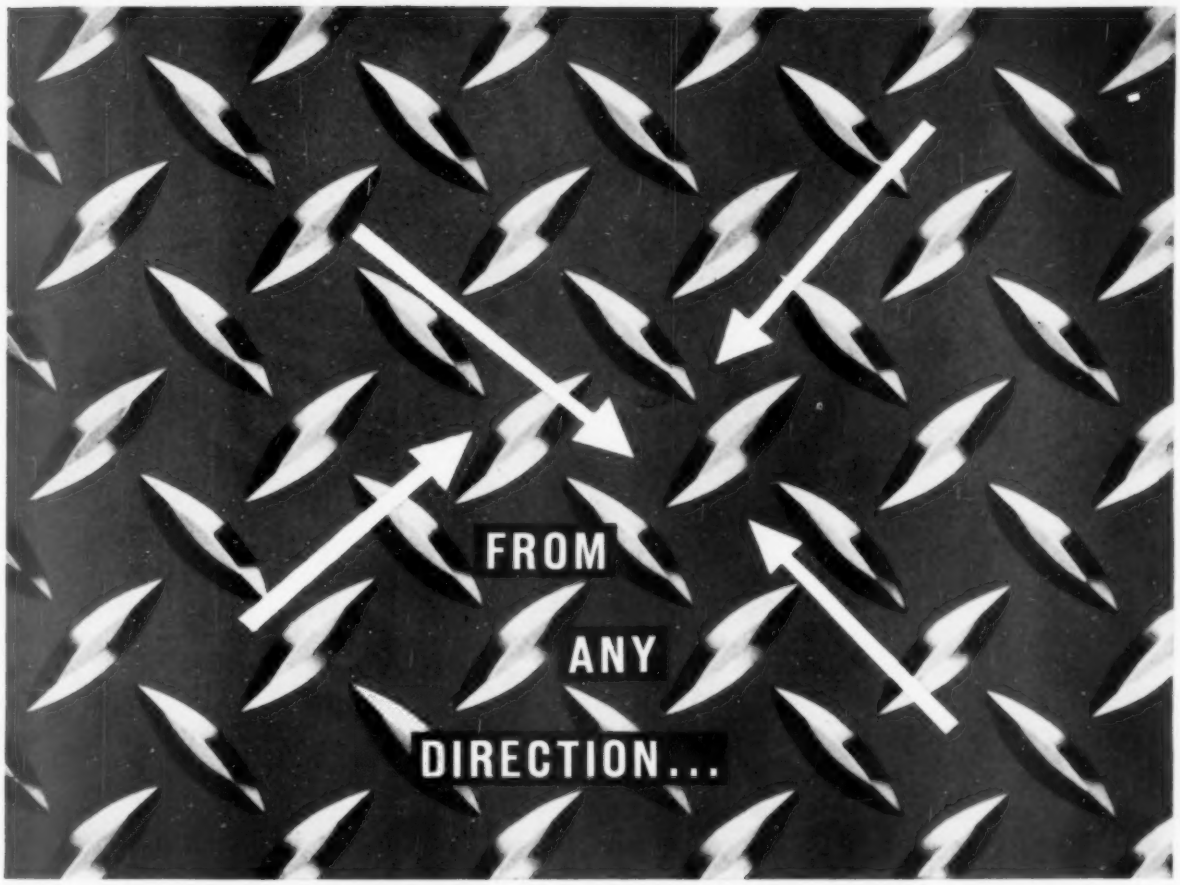
However, I am confused with the figures as shown in question 11 concerning the percentage of employees in standards work in relationship to the total number of employees. How is it possible for the average per cent to be lower than the minimum per cent? Would appreciate your helping me to get a clearer picture of the situation.

N. M. Patterson
Standards Supervisor
James B. Clow & Sons, Inc.
Coshocton, Ohio

► We are delighted with the excellent reception our survey, "The Truth About Wage Incentives and Work Measurement Today," has received. Since we promised that all replies to this survey would be kept confidential, we cannot divulge the names of the respondents. If we had not guaranteed this, we doubt very much if our figures would have given such a clear picture of industry's thoughts on wage incentives, etc.

However, we are sorry about the error in question 11. We originally set up the figures in terms of number of employees in standards work per 1000 plant employees. Then we changed it to a base of 100, expressing standards employees as a percentage of plant employees. In the process, only the column of averages got changed; minimum and maximum columns were still on the 1000 base.—ED.

Turn to page 14



Alan Wood Super Diamond floor plate ...is easy to clean

Sweep it . . . hose it . . . mop it . . . at any angle, A. W. Super Diamond is easy to clean. No pockets to hold dirt or water . . . the unique design of this rugged floor plate lets water drain quickly in any direction.

A. W. Super Diamond is easy to fabricate, too . . . it can be sheared, welded, formed, and easily matched. The arrangement of the exclusive pattern allows you to bend it at any place. This is a heavy duty floor plate that will last for years . . . and provide a safe, non-skid footing.

For easy cleaning . . . for easy fabrication and installation . . . for long wear . . . specify A. W. Super Diamond. Write for Bulletin SD-N10.

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CONSHOHOCKEN, PA.

DISTRICT OFFICES: Philadelphia • New York • Los Angeles • REPRESENTATIVES: Atlanta • Boston • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

ALL SIZES, ALL BODY PATTERNS FOR ALL APPLICATIONS

BALANCED VALVES
— for air, steam, water, gas. Designed for applications where close control is required, where pressures exceed those of single-seated valves, and where tight closing is not required. Double-seated construction, approximately 98% tight closing. Sizes ½" to 14". Wide choice of models, capacities and operating features.

COIL VALVES
— for medium pressure steam, liquid, air or gas. Long-life molded rubber diaphragms. ½" to 6" sizes. Body patterns and features for many applications.

CONVECTOR VALVES
Compact size for installation in confined spaces, inside or outside convector enclosures. Models for low pressure steam, hot and cold water. All models have "Sylphon" metal bellows operators. Sizes ½" and ¾".

LIQUID VALVES
— for low pressure hot or cold water service. Choice of molded rubber diaphragms or seamless "Sylphon" bellows. Removable tops. Wide choice of features and body patterns. Sizes ½" to 8".

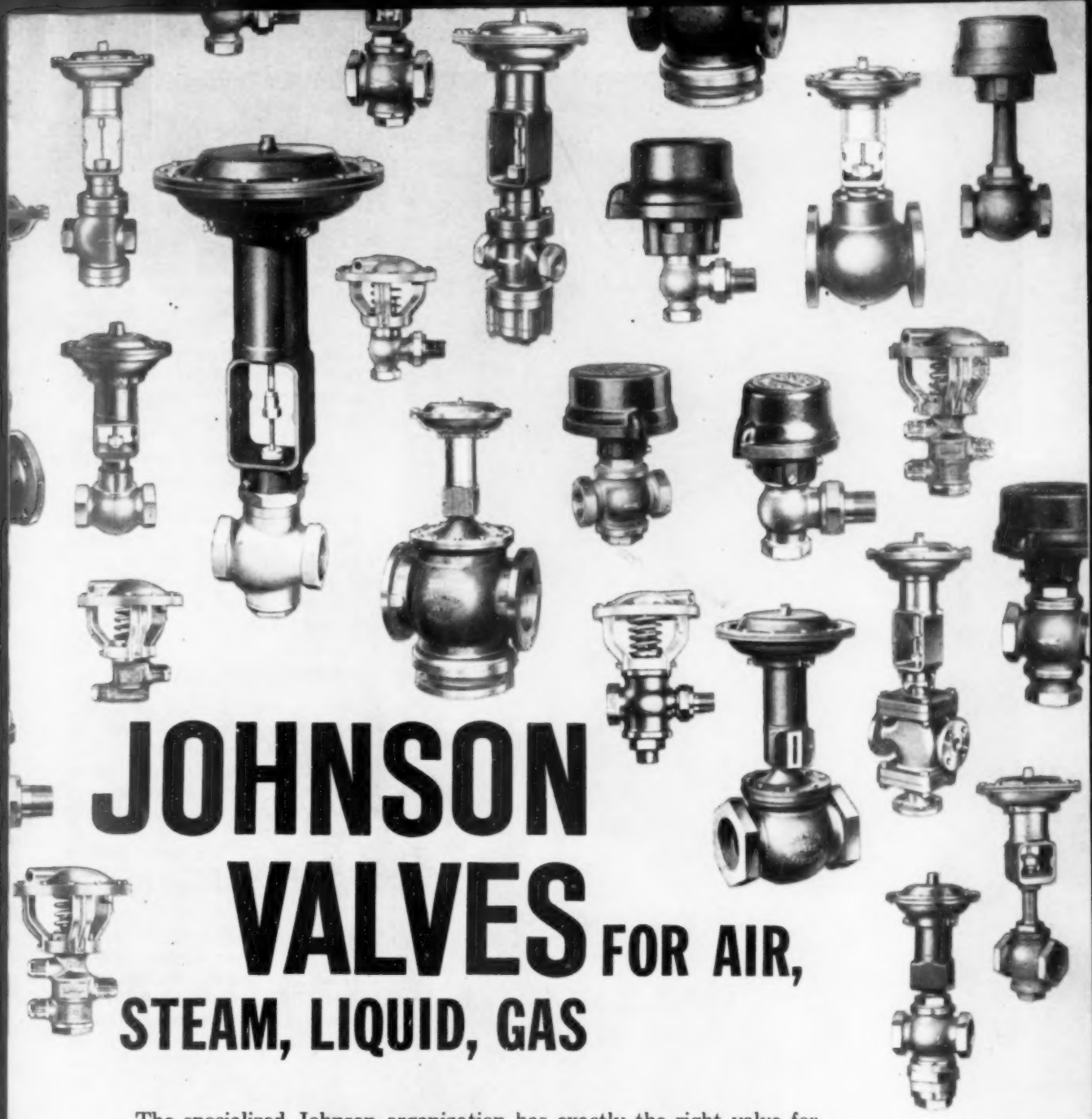
MIXING VALVES
— for applications requiring the mixture of liquids at different temperatures under control of a thermostat or humidostat. "Sylphon" and rubber diaphragm operators. Removable tops. Available in ½" to 10" sizes. Body patterns and operating features for every application.

BY-PASS VALVES
— for control of liquids over a wide range of temperatures and pressures. Sizes ½" to 6". Models available with 100% tight shutoff. Removable operators.

WATER VALVES
— especially designed for use with small room air conditioning and heating units. High grade bronze bodies. Rubber diaphragm operators. Corrosion resistant throughout. V-ring self-sealing packing assures positive seal. Renewable composition discs. Sizes ½" and ¾".

STEAM VALVES
— for control of low pressure steam. Rubber diaphragm or seamless "Sylphon" operators. Renewable composition discs especially compounded for steam service. Sizes ½" to 10". Choice of body patterns and features.

BRINE VALVES
— for control at pressures up to 50 psi. Cast iron or bronze bodies. Rubber diaphragm or "Sylphon" operators. Renewable discs, especially compounded for brine service. Removable tops. Sizes ½" to 8" in a variety of body patterns.



JOHNSON VALVES FOR AIR, STEAM, LIQUID, GAS

The specialized Johnson organization has exactly the right valve for every possible air-conditioning, heating, or ventilating control system application. In fact, Johnson makes the most complete line of pneumatic equipment in the industry — for solving any problem of temperature, humidity, or pressure control.

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PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

JOHNSON SERVICE COMPANY
507 East Michigan St., Milwaukee 1, Wisconsin

☐ Have a Johnson engineer call on me.

☐ Send your new condensed catalog of all types of Johnson Pneumatic Control equipment.

Name_____

Title_____

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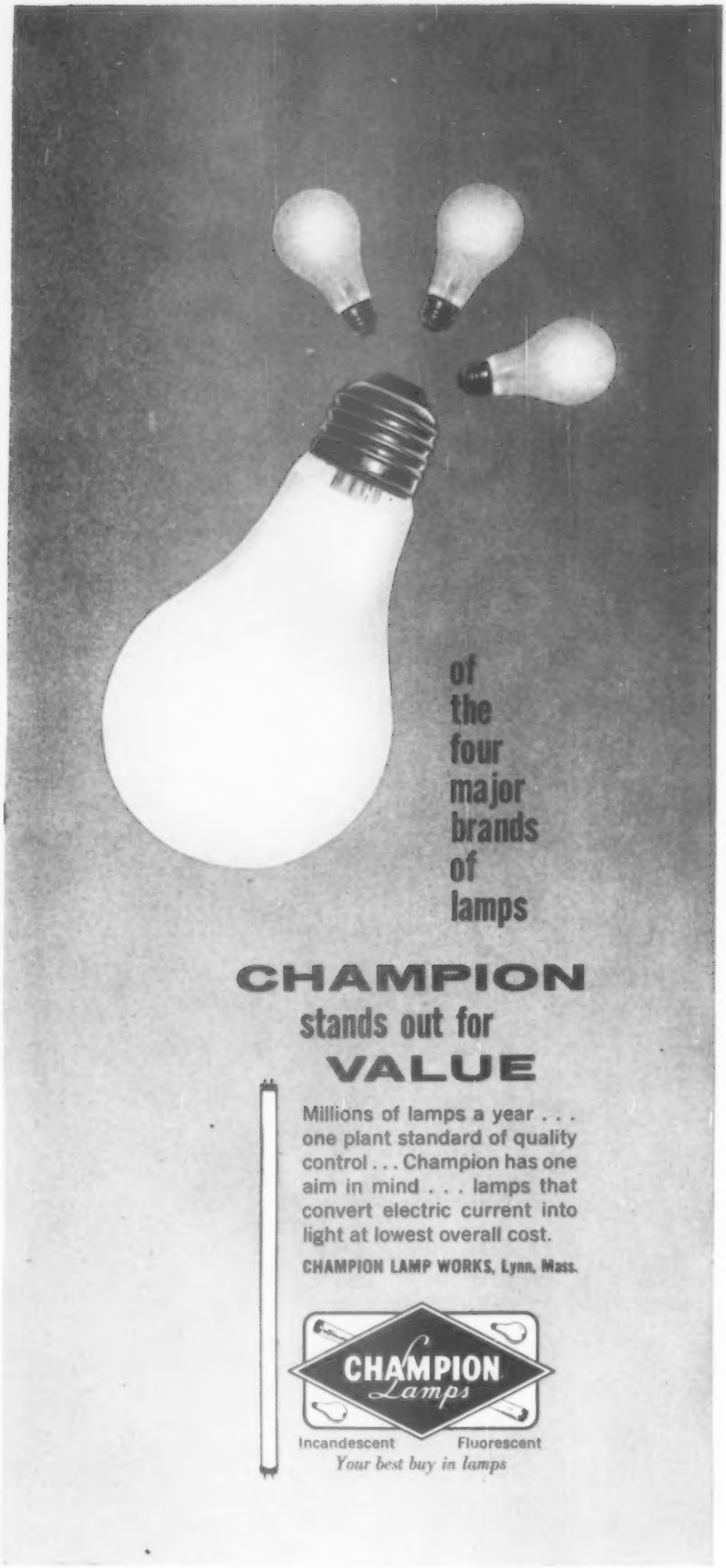


FACTORY / LETTERS

Begins on page 8

CONGRATULATIONS

Sir:

May I congratulate you for your excellent article, "What Every Operating Man Should Know About Productivity," in the April issue of FACTORY (page 246). It is the most comprehensive, yet down-to-earth treatment of the subject I have seen. I wholeheartedly concur with your position that there is no compelling reason for relating wages to productivity statistics.

R. O. Traylor
Director, Employee Relations Dept.
Standard Oil Co., Chicago 80

► Many thanks for the bouquet on our productivity article. I am glad you thought we succeeded in giving a down-to-earth approach to this highly publicized and complicated subject.—ED.

INFORMATION WANTED

Sir:

I recently read an article in FACTORY that included information concerning a Work Order System. I would appreciate your sending me any articles that you have published on this subject.

James Shubert
Bowman Steel Corp.
Pittsburgh 30

► I am enclosing reprints of articles FACTORY has published on Work Order Systems. We have reprints of FACTORY articles on various subjects and are glad to supply readers with them. For a list of available reprints write to Reader Service, FACTORY, 330 West 42nd St., New York 36.—ED.

Sir:

Could you furnish a list of consulting firms offering Predetermined Time Standards systems that could apply to the production of aggregate equipment for the construction industry? Our production runs are short—mostly under 100 pieces.

Louis F. Keller, Jr.
Production Methods Dept.
Pioneer Engineering
Division of Poor & Co., Inc.
Minneapolis 14, Minn.

Turn the page

...a bright spot in maintenance costs

The Finest Paints Made with Aluminum are made with REYNOLDS ALUMINUM PIGMENT

Highly reflective, long-lasting aluminum paint prevents rust... resists corrosion... keeps costs down

Paint made with Reynolds Aluminum pigment protects surfaces by forming a shield of pure aluminum. Weathering extremely well, this shield guards under-surfaces against rust, rot and corrosion. It's your best investment in low-cost preventative maintenance. And remember: aluminum reflects radiant heat to keep building and tank interiors up to 14° cooler, and to protect volatiles from evaporation. *Reynolds Metals Company, P.O. Box 2346-PJ, Richmond 18, Virginia.*

REYNOLDS ALUMINUM

Watch Reynolds TV show—"WALT DISNEY PRESENTS"—every week on ABC-TV.

For more facts Circle 458 on Reader Service Card

How to keep water in!

All Concrete Masonry
NEEDS CONCRETE PROTECTION

Before THOROSEAL was applied, note porous concrete structure.

THOROSEAL PROTECTION!

Just like concrete, THOROSEAL is cement-based, and therefore perfectly compatible with the concrete masonry to which it is applied; actually becomes part of the structure!

Here, the City of Miami's Department of Water and Sewers Maintenance Crew is applying THOROSEAL to all the masonry of their new 2,500,000 gallon Alexander Orr Filtration Plant. Although the poured concrete structures of these tanks are excellent examples of engineering, it was imperative that they would not deteriorate from constant water pressure.

The interior and exterior surfaces of the elaborate structure were given one brush coat of STANDARD GRAY THOROSEAL and one trowel coat of PEARL GRAY THOROSEAL. THOROSHEEN RW 7, acrylic masonry paint, was applied over the THOROSEAL, for extra beauty, in several areas.

The city of Miami's foresightedness in taking these precautionary steps will save them thousands of dollars in maintenance costs and water loss due to leakage.

THOROSEAL has now completely filled and sealed the concrete against all weathering and loss of water.

THOROSEAL also protects the outside masonry of filtration plant against the elements and deterioration.

Contractor — PITT CONSTRUCTION COMPANY.
Subcontractor — FRED HOWLAND CONSTRUCTION COMPANY.

Write for our new 20 page Specification Guide, WS-17, just off the press. →

Standard Dry Wall Products, Inc.
BOX X, NEW EAGLE, PA.

FACTORY / LETTERS

Begins on page 8

► Following are three consulting firms that have done a great deal of work with Predetermined Time Standards systems: The Work-Factor Co., 366 Madison Ave., New York 17; H. B. Maynard & Co., Inc., 718 Wallace Ave., Pittsburgh 21; J. D. Woods & Gordon, Ltd., 15 Wellington St. W., Toronto 1, Canada.—ED.

REBUFF REBUFFED

Sir:

Re: "Rate of Return—Toughest Measure of a Manager" by L. G. Smiley, November 1958 issue (page 90) and the anonymous letter to the editor, March 1959 issue (page 8). While there were perhaps some shortcomings in Mr. Smiley's article, the anonymous letter criticizing it was in rather poor taste.

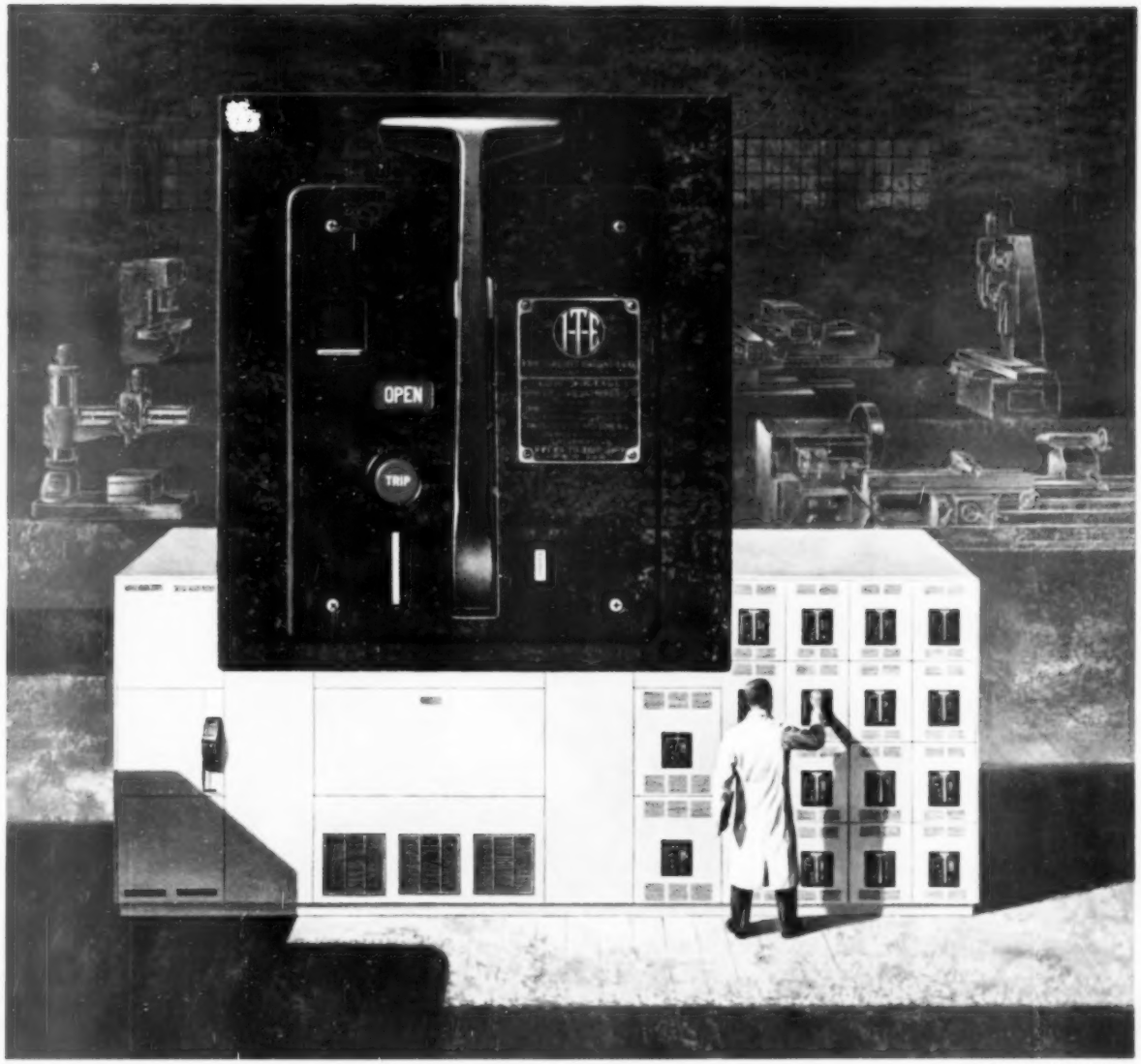
In general, McGraw-Hill is to be commended for their "Plan '59" series. Their attempt to point up some of the economic and financial problems which face management, together with a discriminating presentation of alternative solution methods, was a valuable one. Specifically, the FACTORY article performed a service by explaining in detail why compound interest methods are superior and such misleading rules-of-thumb as the "Accounting Method" and "Payback Method."

Presenting many variations of as complex a subject as capital equipment replacement economy is a difficult task for any writer. Most authors would require a whole book. For a limited journal article, oversimplification and incompleteness of some aspects must inevitably creep in. But this does not necessarily indicate naiveté on the part of the article's author.

David A. Thompson
Acting Assistant Professor
Dept. of Industrial Engineering
Stanford University, Stanford, Calif.

► Many thanks to Professor Thompson for his intelligent understanding of the "shortcomings" of Mr. Smiley's efforts. We continue to feel that Mr. Smiley in this article did a remarkable job of presenting an effective solution to a complicated problem.—ED.

For more facts Circle 459 on Reader Service Card
For more facts Circle 460 on Reader Service Card ►



Painting by Ned Seidler

FACT

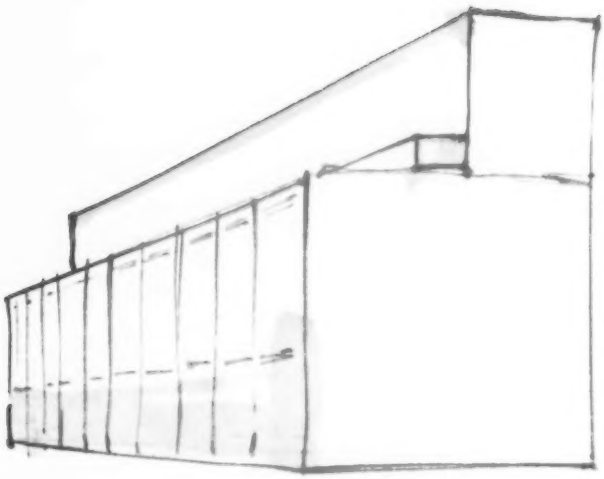
A dollar allocated for electrical equipment is worth more . . . when it is used to buy I-T-E equipment. Because I-T-E's policy is to build its equipment better, and yet charge no more.

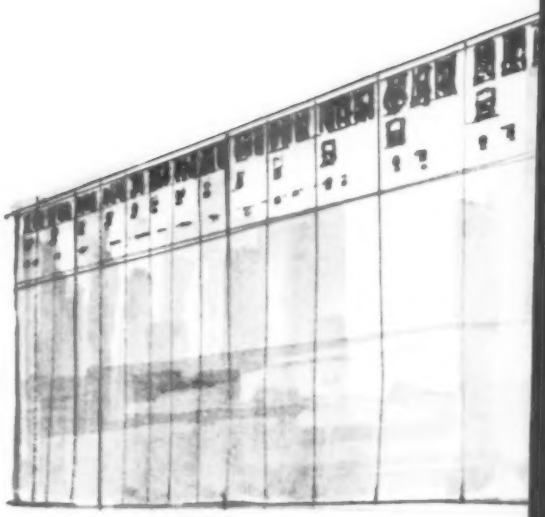
Take a typical secondary unit substation, for example. It features the new K-LINE circuit breakers . . . today's most advanced line. They stack four high in ratings up to 600 amp . . . save roughly ⅓ the space and half the weight formerly required. Circuit breaker pulldown handle with stored energy mechanism gives quick-make closure that means greater operator safety and longer contact life. The breaker can be drawn out to disconnect position without opening the door. And if the load increases later, expanded range trip devices adjust quickly and without added expense.

These features add up to real dollars and cents savings over the life of the equipment. Yet they cost nothing extra. In addition, I-T-E substations are engineered and manufactured in a single I-T-E plant for extra installation ease and better performance.

There are other I-T-E facts too. Turn page.

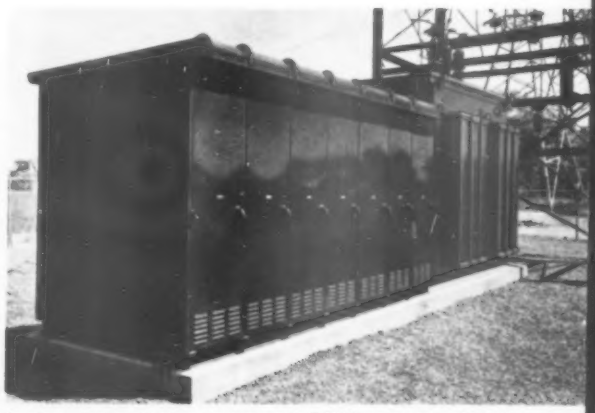
I-T-E CIRCUIT BREAKER COMPANY



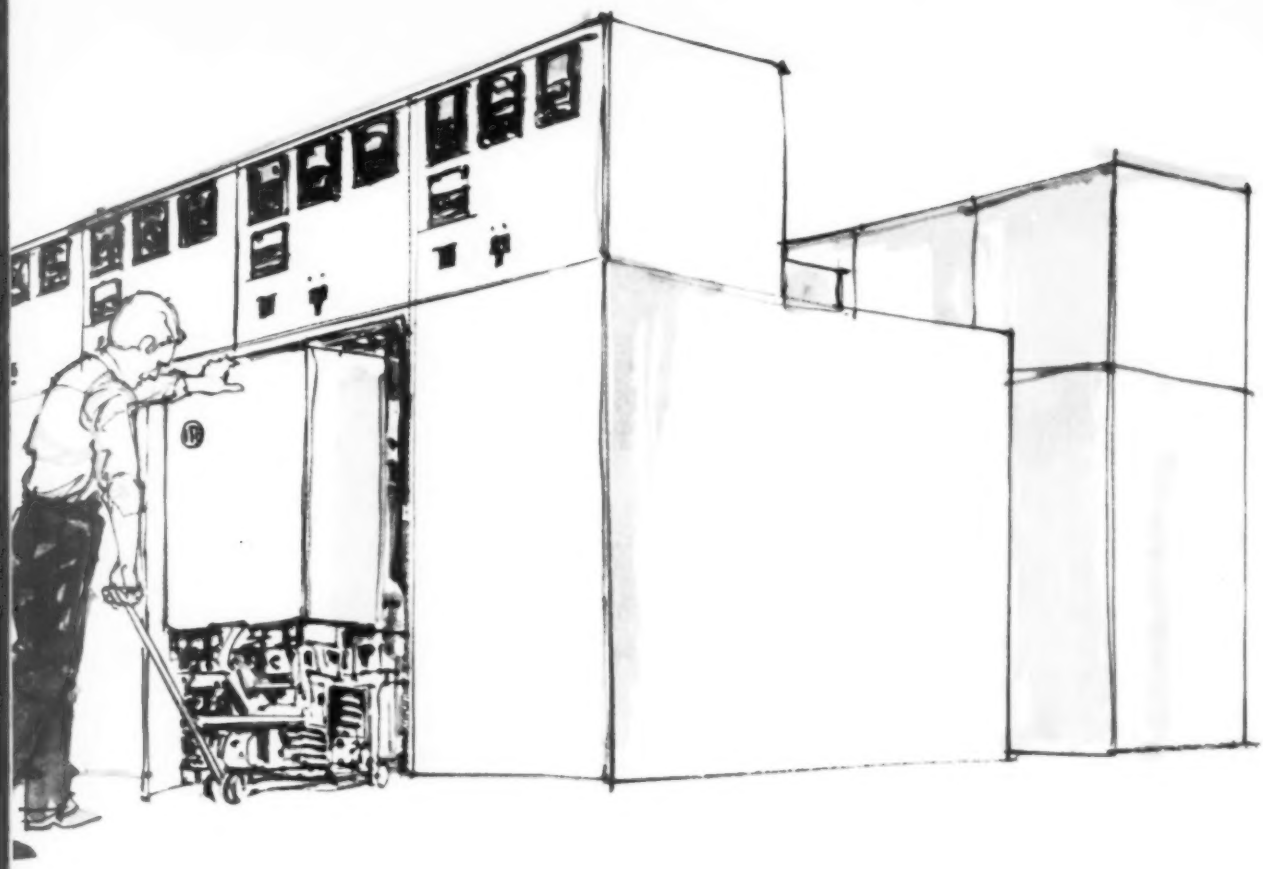


WHERE ELECTRICITY GOES I-T-E GOES

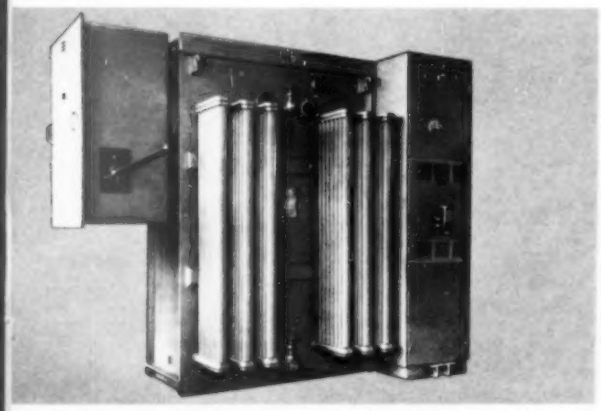
Are you fully acquainted with the broad I-T-E line . . . and the many ways it can help your dollars buy more?



Custom designed at no extra cost. I-T-E primary unit substations are designed and built to meet the specified power, space and future expansion requirements of the particular installation for which they're ordered. In addition to standard outdoor metal-clad construction, weatherproof walk-in switchgear is also available. Transformer and switchgear sections are constructed in the same plant to assure smooth coordination of components, easier assembly, pretested performance, and on-time delivery.

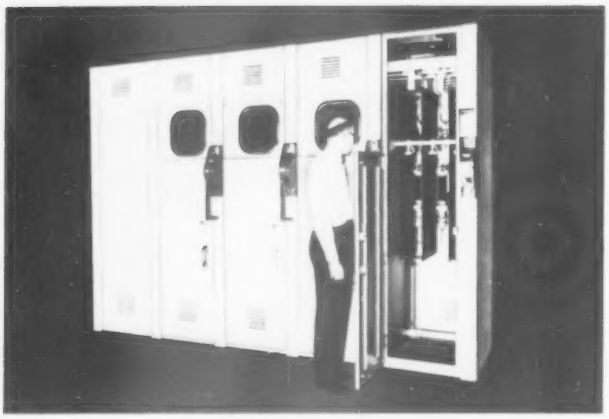


Protection for primary power. I-T-E metal-clad switchgear has many extra advantages not available elsewhere. Take a good close look. You'll find extra sturdiness that means extra serviceability. And extra craftsmanship that gives the owner a feeling of pride. For easy inspection, even the rear doors are hinged, and components are completely accessible. All essential circuit breaker components are mounted on the breaker for easier access. Uniform flux density magnetic arc field means superior protection . . . especially against high current faults. For extra safety, breakers stop automatically in test position when they're rolled into the compartments. They can't be moved into or out of connected position unless they're open.

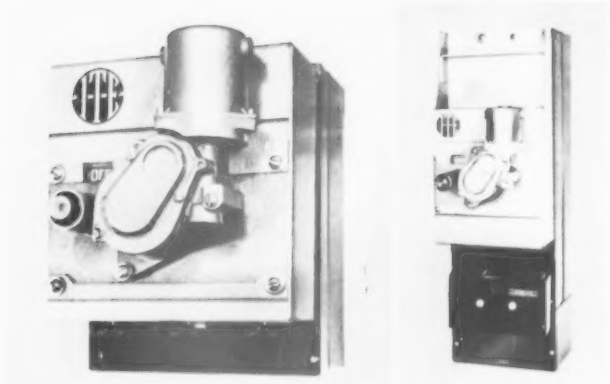


Self-contained substation. Saves installation cost. I-T-E TRANFO-UNIT combines primary disconnect, transformer and secondary circuit breakers all in one package. Nothing else to buy. Simplifies ordering. Delivered complete. Installation time and cost reduced to an absolute minimum. No complicated assembly of separate parts. Gives neat appearance. Completely safe. No live components open to contact by personnel. Needs no fence. Use for incoming power up to 3000 kva. Or spot near load areas in large plants.

600 volt value package. New URELITE® individually enclosed I-T-E K-LINE circuit breaker is ideal for single circuit protection and control, such as large motors and other heavy loads or for service entrance on many commercial-type buildings. Main disconnect contacts are visible through a side window for extra safety. Features quick-make closure, closed door disconnect, and expanded range trip device. Available in capacities from 15 to 1600 amp continuous, up to 75,000 amp interrupting.



Economical primary switching. I-T-E power switching centers save cost and time. Give dependable fused protection at low initial investment. Building block design speeds delivery. Preassembled units easy to install. Performance-proved I-T-E switches close safely into fault. Available for remote or automatic control. Up to 14.4 kv and 1200 amp.



Molded case economy . . . remote control luxury. Now I-T-E CORDON® circuit breakers are available with new TELEMAND® motor-operators for remote opening, closing or resetting. Gives pushbutton control from a distance. Permits automatic operation. CORDON circuit breakers provide up to 100,000 amp interrupting capacity in roughly half the switchboard space required by alternative devices. They cost approximately ⅓ less. TELEMAND is available for the complete range of molded case circuit breakers from 70 to 800 amp.

**Telemand is an I-T-E trademark*

I-T-E Circuit Breaker Company 4-3A

1900 Hamilton St., Philadelphia 30, Pa.

- ☐ Secondary unit substations
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ Primary unit substations
- ☐ URELITE circuit breakers
- ☐ Molded case circuit breakers
- ☐ Metal-enclosed bus
- ☐ Outdoor air switches
- ☐ TRANSFO-UNITS
- ☐ Power switching centers
- ☐ TELEMAND (motor-operated molded circuit breakers)
- ☐ K-LINE LV switchgear (600 volt)
- ☐ Reclosers
- ☐ Distribution cutouts
- ☐ Other

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

SEND COUPON

Get complete, up-to-date information on I-T-E equipment.

I-T-E CIRCUIT BREAKER COMPANY

When production flow depends on a heavy duty hoist . . .
LO-HED® PERFORMANCE COMES BEFORE PRICE.

When you hit the *really* tough aerial handling problems . . . in places where production flow depends upon continuous hoist performance, and hoist down-time means lost production . . . you need the extra margin of heavy duty performance that only an AE LO-HED hoist can give. Or when you bump into tough headroom problems, LO-HED hoists give you extra feet of lifting height . . . lift loads closer to the ceiling—give you maximum use of every cubic foot in the hoisting area.

The AE LO-HED is built for these trouble spots . . . the spots in your plant where conventional heavy duty hoists just aren't "heavy duty" enough . . . the spots where you are hemmed in by fixed ceiling height . . . the spots where performance comes before price.

For complete information and specifications, refer to Sweets Plant Engineering File 1a/Ae, or write for your copy of our new catalog H-59. AMERICAN ENGINEERING COMPANY, Dept. H-178, Philadelphia 37, Penna.

AMERICAN ENGINEERING COMPANY

Hele-Shaw and Hydramite Pumps • Lo-Hed Hoists • Vibra-Grate, Perfect Spread and Taylor Stokers

AE Marine Deck Auxiliaries.

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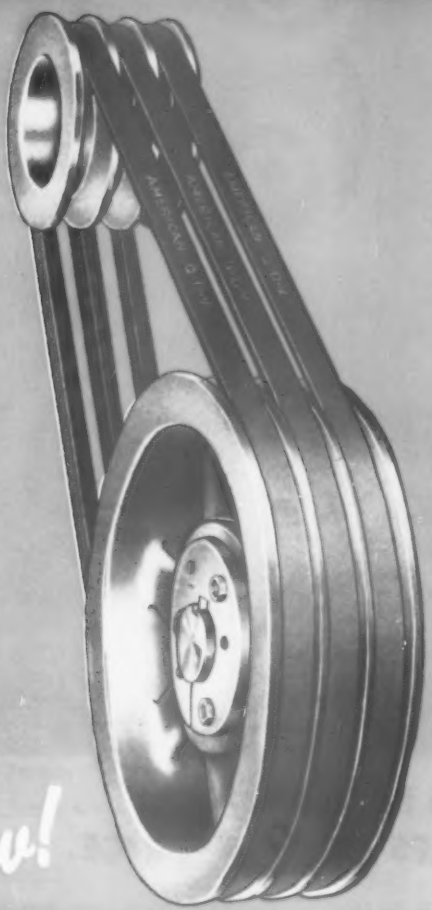
Now American Pulley makes it possible to standardize on the

WORLD'S MOST COMPLETE

TWO NEW LINES!



New!

AMERICAN Q·D·V DRIVES

Easy mounting. Easy removal. Interchangeable Q-D bushed sheaves for A, B, C and D section belts.

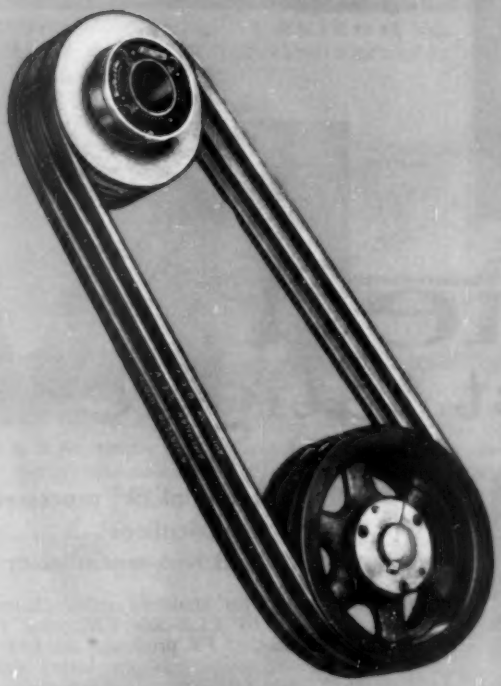
New!

AMERICAN 3·5·8 DRIVES

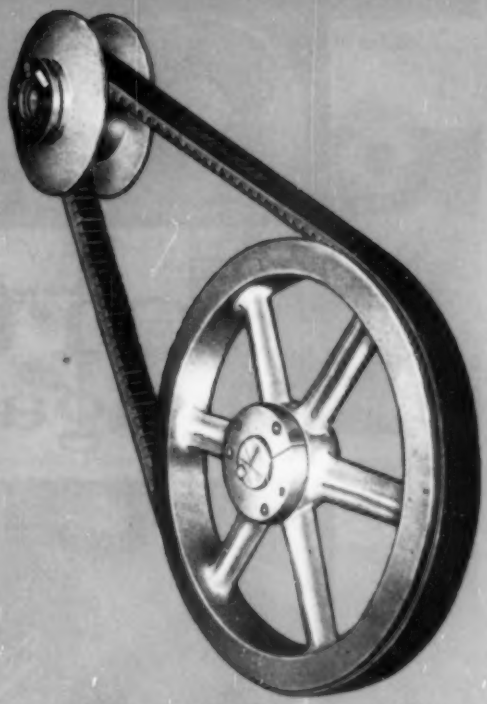
Compact. Smaller, lighter, Q-D bushed sheaves transmit more hp in less space, at less cost, with fewer belts.

LINE OF V-BELT DRIVES

TWO OLD FAVORITES!



AMERICAN STANDARD ADJUSTABLE-SPEED DRIVES



AMERICAN WIDE RANGE ADJUSTABLE-SPEED DRIVES

Patented double-taper hubs are easy to install, adjust, remove—and *they stay that way!* Positive gripping action. Perfect belt alignment. Standard adjustable-speed sheaves provide infinite adjustment up to 28%. Wide range adjustables permit infinite variations up to 2 to 1.

Get immediate off-the-shelf delivery from your local distributor.

If he doesn't have them yet, write to us. We'll give you the name of the nearest distributor who stocks the complete American Pulley line for your convenience.

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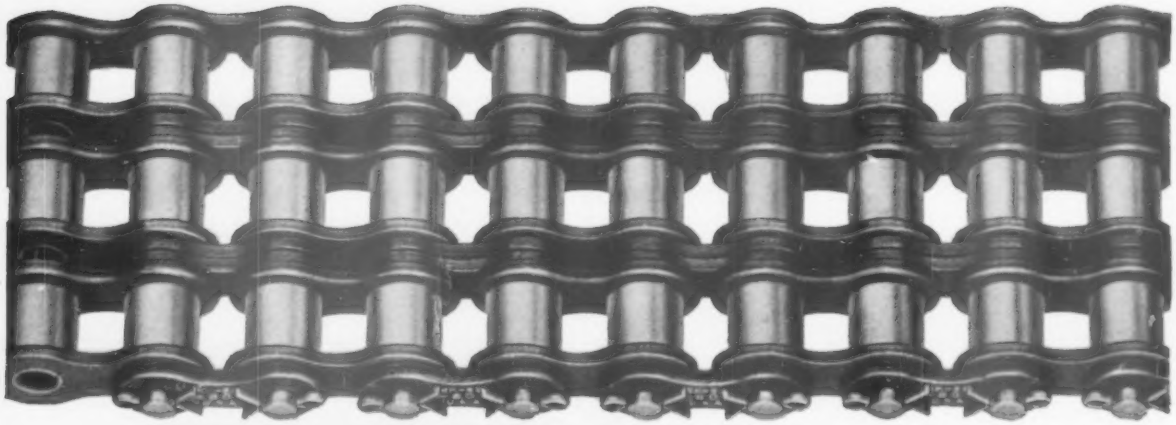
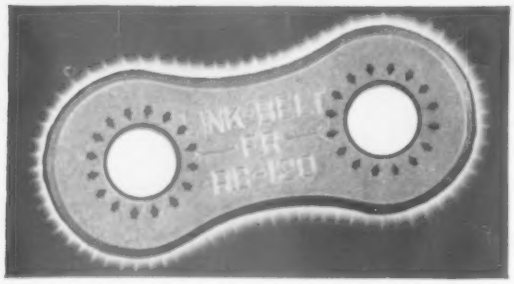
POWER TRANSMISSION DIVISION

THE AMERICAN PULLEY COMPANY

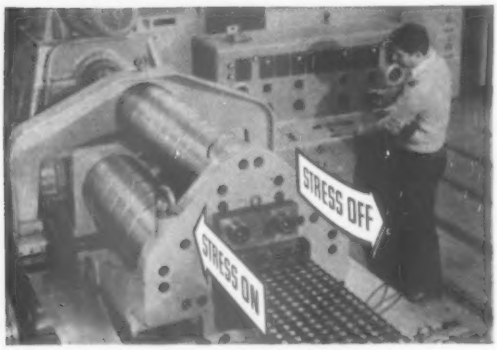
4200 WISSAHICKON AVENUE · PHILADELPHIA 29, PA.





Arrows indicate critical areas treated with compressive stresses to improve fatigue resistance.

Fortified against fatigue



65 TONS OF CYCLIC TENSION! With this equipment—largest of its kind known to be in operation in roller chain testing—Link-Belt tests and rates roller chains. Rapid "stress-on, stress-off" action duplicates operating conditions at a greatly accelerated pace . . . proving over and over that Link-Belt chains are fortified against fatigue.

Link-Belt offers special FR® processed roller chain for applications involving repeated high-tensile loads

Jobs too rugged for standard roller chains are taken in stride by Link-Belt FR roller chain. Through its patented FR process, Link-Belt gives *greater dynamic strength* to the larger sizes of chain most likely to encounter severe cyclic loading. FR greatly raises the chain's endurance limit by compressing metal around pitch holes—the critical sidebar areas most vulnerable to fatigue failure.

The FR process results from the same design and metallurgical research that has produced many more "extras", all *standard* in Link-Belt roller chains. They include shot-peened rollers, close heat-treat control, lock-type bushings and others. For further details on Link-Belt roller chains, send for Book 2657.

LINK-BELT

ROLLER CHAINS AND SPROCKETS

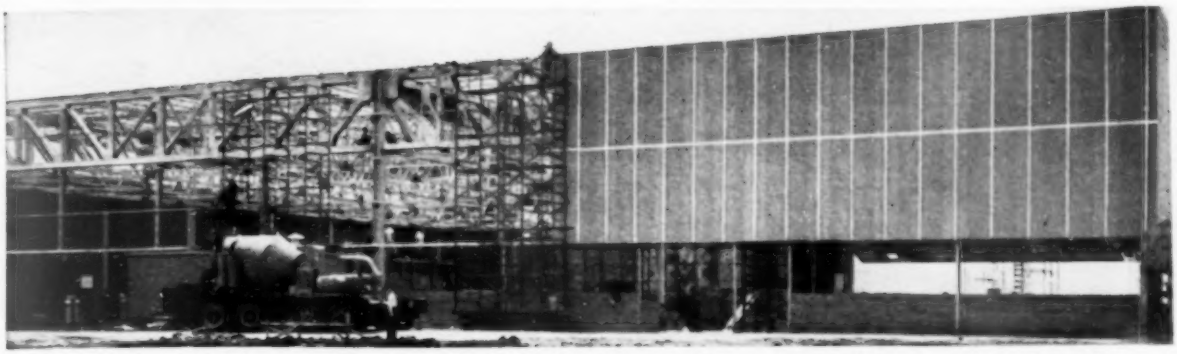
15.079

BOOK 2657 has 154 pages of roller chain data. For your copy, contact your nearest Link-Belt office or authorized stock-carrying distributor. (See CHAINS in the yellow pages of your phone book.)

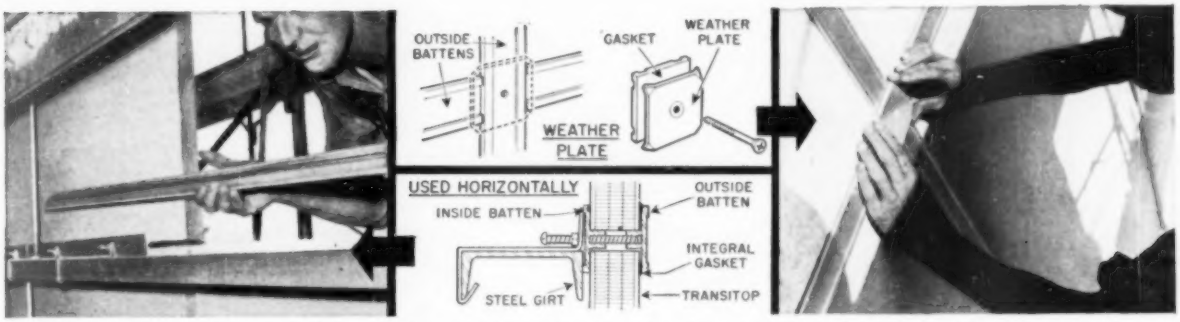
LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

For more facts Circle 463 on Reader Service Card

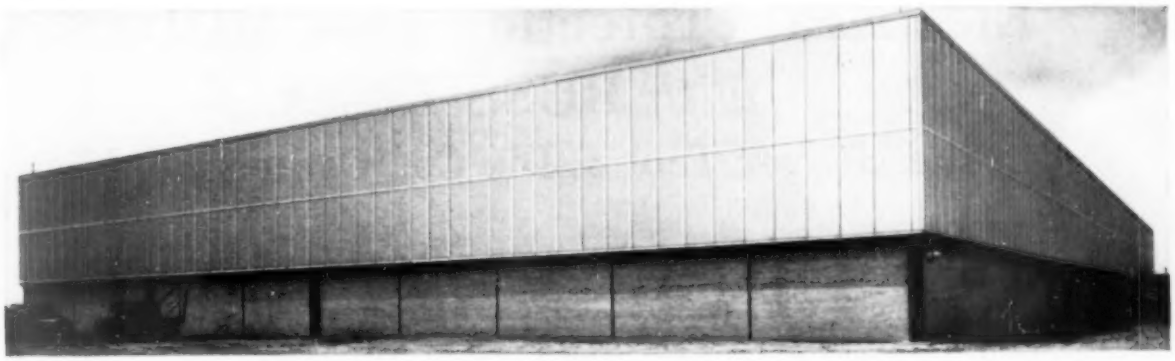
Johns-Manville ASBESTOS TRANSITOP® Panels provide swift, economical, weathertight curtain wall construction



Transitop panels are big . . . 4′ wide x 8′ to 12′ high . . . finish large areas fast . . . structurally strong yet light in weight . . . thicknesses from 11/16″ to 2″. Panels consist of an insulating core with an asbestos facing on both sides.



H & B Aluminum Battens and Accessories provide neat horizontal and vertical joints that . . . simplify wall erection . . . adjust in three dimensions . . . withstand weather, vibration, wind load and thermal change.



Transitop panels are an attractive stone gray in appearance. Pre-primed panels also available for any type of paint finish if color is desired. Using H & B Aluminum Battens, panels can be demounted and reused when constructing building additions.

SEND FOR ILLUSTRATED BROCHURE

See for yourself how J-M Transitop structural panels can be used for economical construction of exterior or interior walls and roof decks. Write Johns-Manville, Box 158, New York 16, N. Y. In Canada, Port Credit, Ont.

JOHNS-MANVILLE

For more facts Circle 464 on Reader Service Card

GENERAL CONTRACTORS: Campbell Construction Co., Detroit, Mich.
ARCHITECT & ENGINEERS: Campbell Engineering Co., Detroit, Mich.
ELECTRICAL CONTRACTOR: Southeastern Electric Co., Detroit, Mich.

Electrical Protection goes MODERN *with* BUSS Fuses

in the Hoover Tool & Die Co., Centerline, Mich.

This new industrial plant on the outskirts of Detroit illustrates that the modern trend in electrical protection is to fuses. The main switch gear is a 1600 ampere pressure switch protected by BUSS Hi-Cap fuses. The distribution panels, both power and light, are equipped with FUSETRON dual-element fuses.

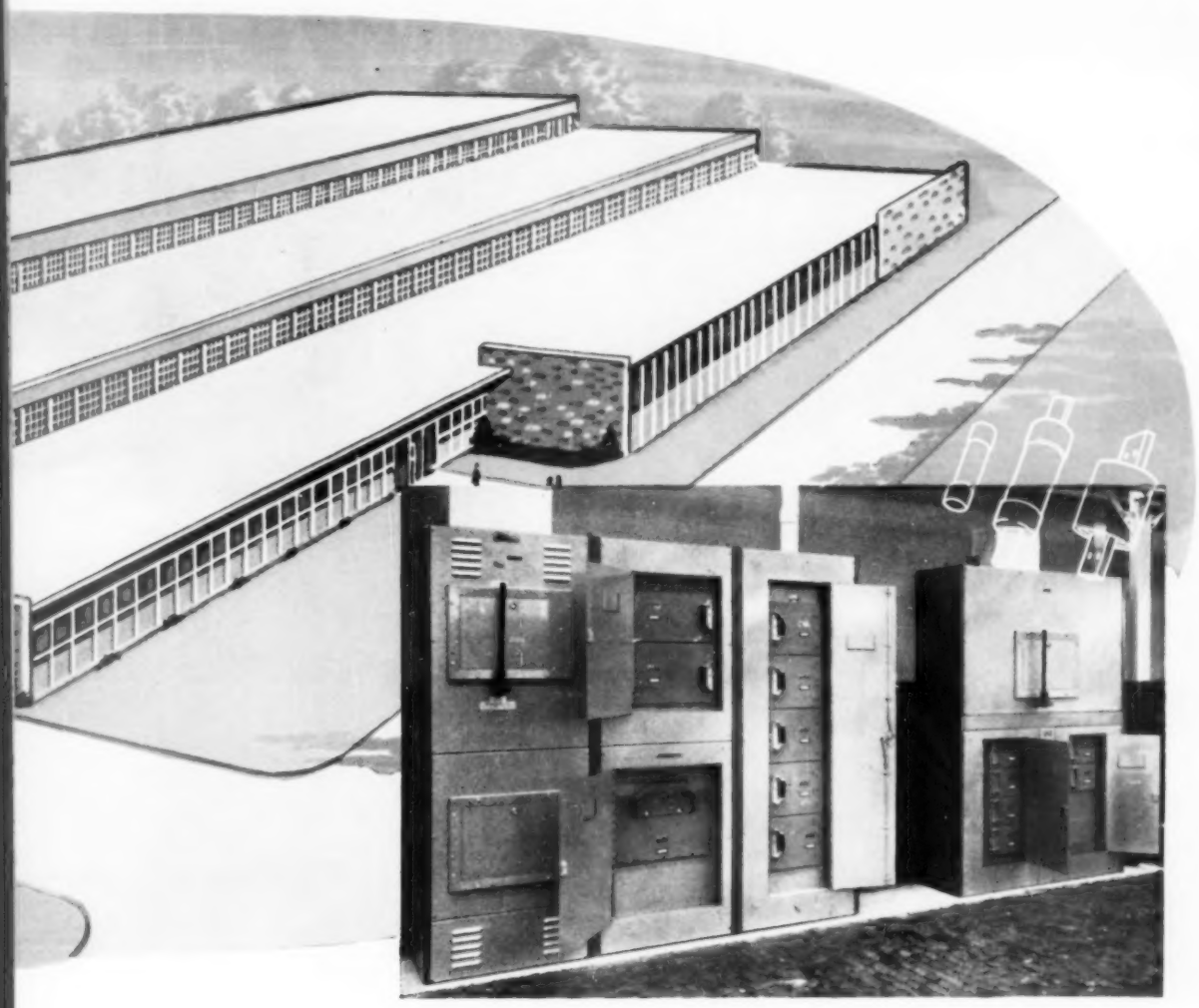
This plant will have many operating advantages because fuses are installed. *For instance:*

Future expansion without sacrificing safe protection.

Provisions were made to install a second 1600 ampere pressure switch when needed. This additional capacity and any increase in available fault current can safely be handled by BUSS Hi-Cap and FUSETRON dual-element fuses.

The interrupting rating of BUSS Hi-Cap fuses is 200,000 amperes rms symmetrical — and for FUSETRON fuses it is 100,000 rms symmetrical.

ANOTHER BUSS HI-CAP AND FUSETRON FUSE INSTALLATION



Main Power Panels —
BUSS Hi-Cap and FUSETRON Fuses

Through the year's savings result from the greater dependability of fuses.

Unlike mechanically operated devices, a fuse has no hinges, pivots or contacts to stick or get out of order. Dust, fumes, corrosion or age cannot increase a fuse's capacity or lengthen its blowing time.

After years of service, a fuse will give the same safe, dependable protection if called upon to open as it would have given on the day it was installed.

The dependability of BUSS Hi-Cap and FUSETRON fuses helps to reduce costs — by preventing damage and loss due to electrical faults — by being maintenance free — by requiring no periodic inspections — and by eliminating shutdowns caused by needless outages.

Is it any wonder then that "ELECTRICAL PROTECTION IS GOING MODERN WITH FUSES"? No other type of protective device can match the combined high-interrupting capacity, dependability and maintenance-free features of fuses.

For more information

On BUSS Hi-Cap fuses . . . . *Write for bulletin HCS*

On FUSETRON dual-element fuses . . . . *Write for bulletin FIS*

BUSSMANN MFG. DIVISION, McGraw-Edison Co. **ST. LOUIS 7, MO.**

ANNOUNCING NEW **POWELL**

Handwheel Nut—securely holds malleable iron, non-heating handwheel to the stem.

Protruding Packing Gland—a Powell feature—compresses the packing, offers additional guidance to the stem, and prevents packing nut from becoming loose and rotating with stem.

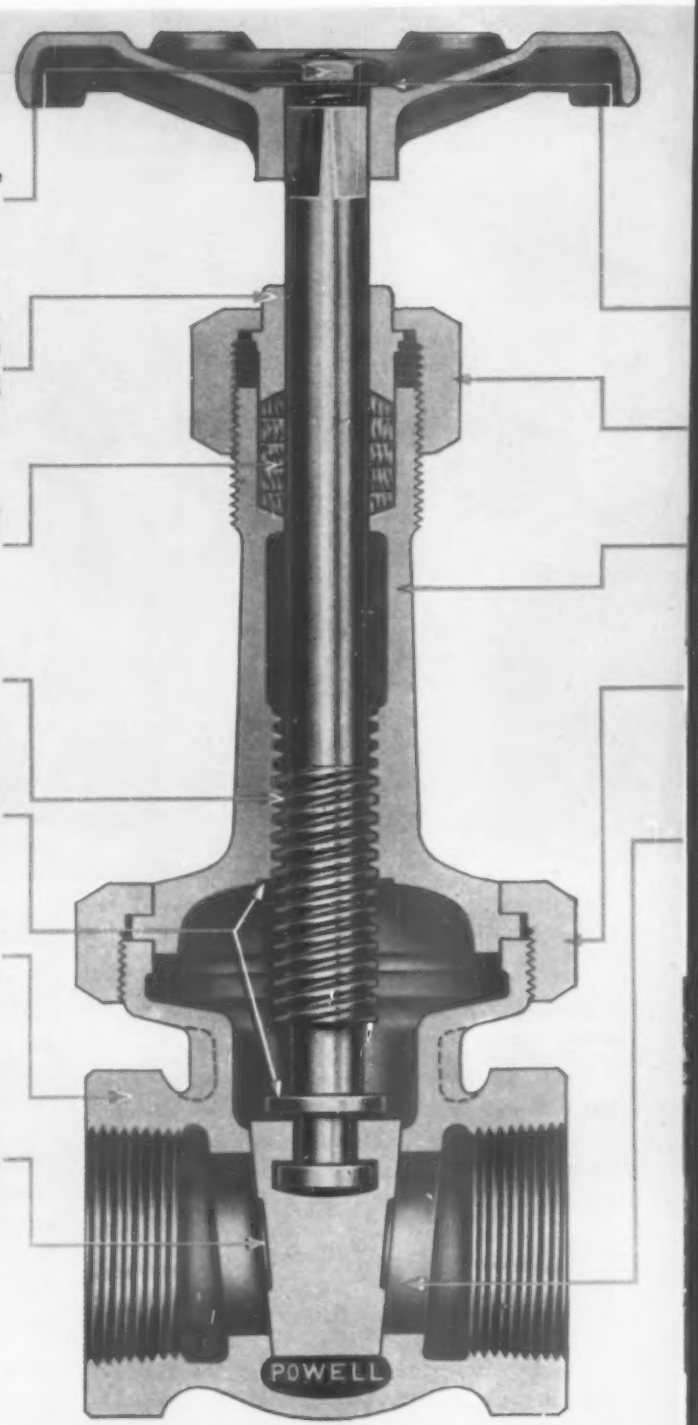
Deep Stuffing Box—holds more than ample amount of high-grade steam packing.

Stem—is high tensile bronze, extra heavy, of large diameter, with long Acme threaded section.

Repack-Under-Pressure Seat and Collar—permit valve to be repacked under pressure when fully open.

Body—a high tensile bronze casting, scientifically designed to provide full flow area through the valve.

Wedges—Interchangeable Solid or Double Wedges are available in rising stem valves. They are held to stem by a "T" slot, and are accurately guided to valve seats by means of integral cast lugs that travel in female guideways in the valve body. Entirely clearing the waterway, full unobstructed flow through is assured.



Sectional—Union Bonnet Rising Stem Gate Valve Fig. 2700—125 pounds, Fig. 2714—150 pounds.

POWELL...world's largest family of valves

FACTORY

BRONZE UNION BONNET GATE VALVES

for 125 and 150 pounds WSP

These new BRONZE Union Bonnet Gate Valves have many superior features—some of which are outlined here. For complete details, write for new illustrated circular. Or check with your nearest Powell Valve distributor.

Identification Plate—gives Figure Number and kind of valve.

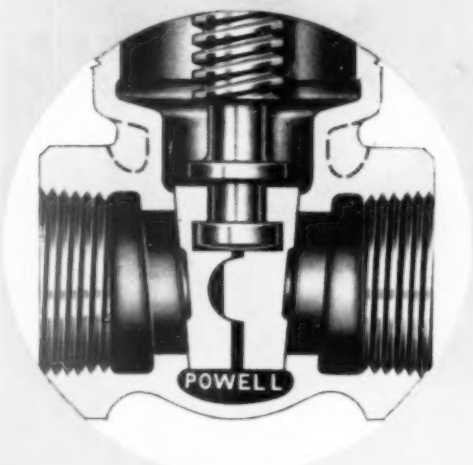
Heavy Hexagonal Packing Nut—for holding gland and adjusting packing.

Long Bonnet—cast of high tensile bronze for long service.

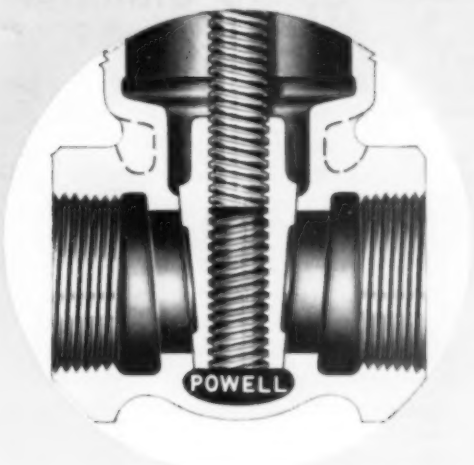
Octagonal Ring Nut—is deep threaded and tightly holds body-bonnet connection. Affords additional wrenching positions.

Ample Space—between seats and end of pipe thread prevents injury to seats when screwing pipe into the body.

Fig. 2707—125-pound Union Bonnet Non-Rising Stem Gate Valve. Also available for 150 pounds—Fig. 2712.



Detail of Sectional View Inside Screw Rising Stem Gate Valve showing Double Wedge Disc and Integral Seats.



Detail of Sectional View Non-Rising Stem Gate Valve showing Solid Wedge Disc that rises on stem. Integral Seats.

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

TAPEnology marks the way with colors that roll on dry!

At Anheuser-Busch, Inc., they make sure their Budweiser cases are kept "on the move" by clear indications of temporary storage areas with easily applied markings of "SCOTCH" Brand Lane Marking Tape No. 471. This colored plastic tape resists wear; won't fade or dry out; is ready for traffic immediately. Eight brilliant colors let you "color code" for storage zones, work areas, truck lanes, etc. Markings can be changed day-to-day if necessary; handy "SCOTCH" Brand Lane Marking Applicator M-77 makes it a quick, clean, one-man job!

Get the complete story on this modern and efficient method for lane and other floor marking from your "SCOTCH" Brand Tape Distributor. Or, write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. IAE-79.

When tape costs so little, why take less than "SCOTCH" Brand?

SCOTCH® BRAND

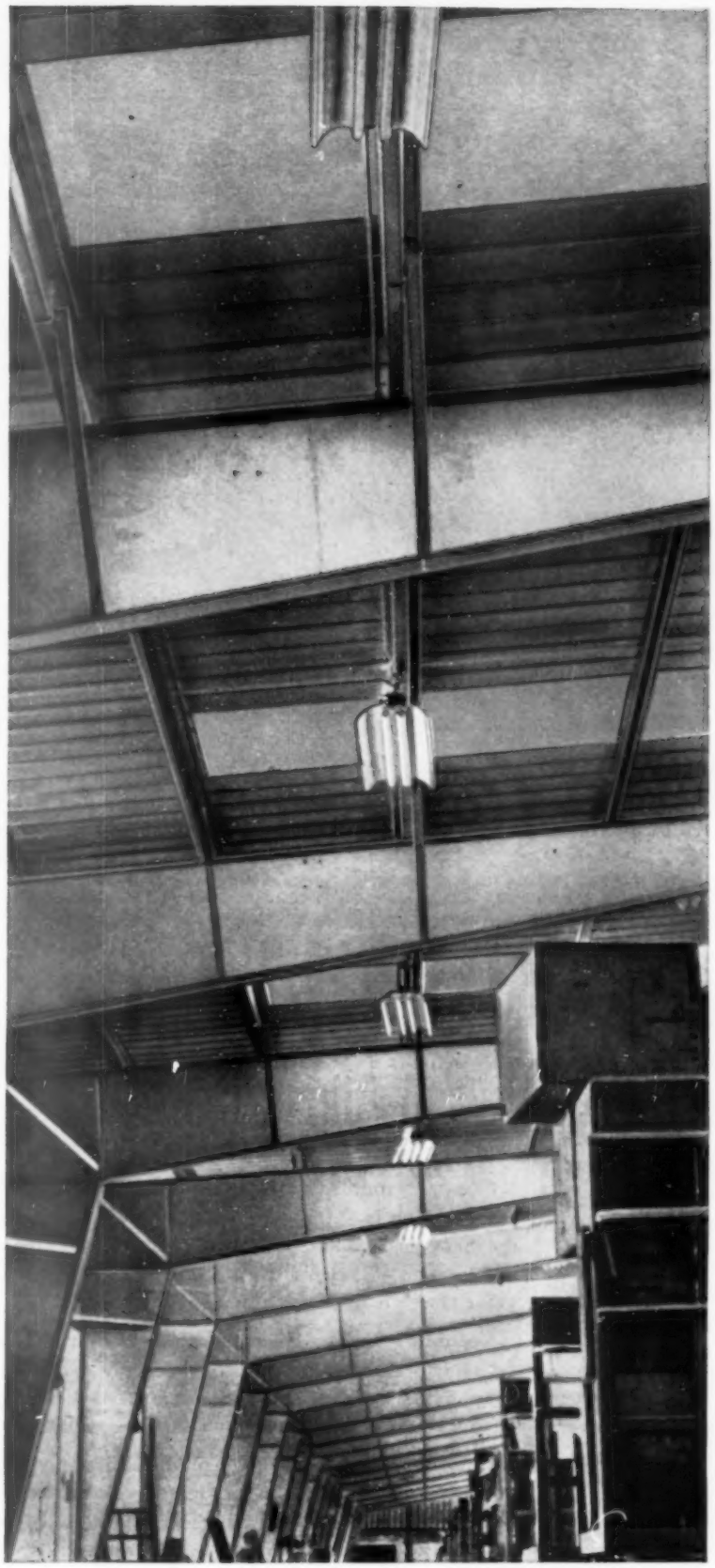
"SCOTCH" is a registered trademark for the pressure-sensitive adhesive tapes of 3M Co., St. Paul 6, Minn. Export: 99 Park Ave., New York 16. Canada: London, Ontario.

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

For more facts Circle 467 on Reader Service Card



Cut glazing and skylighting costs

with STYLUX Daylighting Panels

New Stylux not only eliminates window breakage and cuts artificial lighting bills – it also lowers the overall cost of changing over to daylighting panels.

First of all, you get a proved longer life without replacement due to a new weather-tested resin bonded to an improved, superior quality fiberglass mat. This produces a tougher panel of unmatched clearness providing up to 90% light transmission for industrial use.

Secondly, new Stylux comes in a larger, money-saving 51-inch size that is a 4-foot coverage section. Depending upon the job, this larger size means considerable savings in time, labor and fastening costs. You get this plus at no increase in price!

Stylux comes in all standard panel and window pane sizes, is easily installed. All types of corrugations and flat panels. Shatterproof, non-corrosive, flame-retardent grades of Stylux bear both Underwriters' Laboratories and Factory Mutual labels.

Enjoy the savings and protection of skylighting panels; insist upon the better quality, the greater economy of Stylux. For full-color literature and specification data, for the name of your nearest Stylux Dealer, write us at the address below.

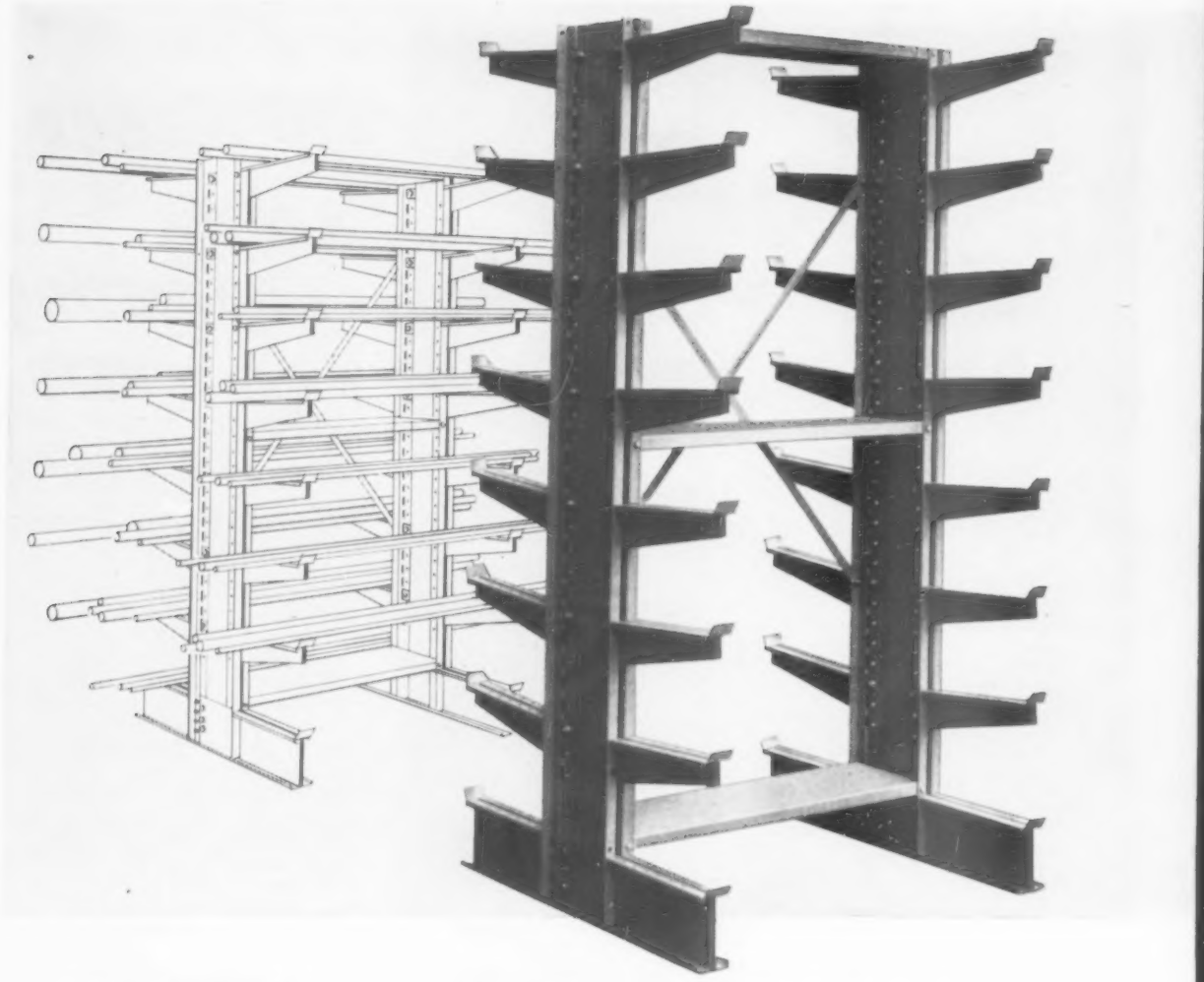
Stylux™ BY BUTLER

PLASTICS DEPARTMENT, BUILDINGS DIVISION

BUTLER MANUFACTURING COMPANY

Dept. 110, 7400 East 13th Street
Kansas City 26, Missouri

For more facts Circle 468 on Reader Service Card



STACK and STORE 14 Tons

IN 36-INCH SPACE...WITH NEW REPUBLIC BAR RACK

This new, all new, double-faced, double duty Republic Steel Bar Rack stacks and stores 14 tons of bar type stock in 36 inches of floor space!

Here is the ideal solution to a practical, economical way to stack and store bars, pipes, rods, any elongated stock. And you can load and unload this new Republic Bar Rack from either side.

Strong and sturdy—made of steel. Engineered and designed for shop convenience. Arm arrangement permits easy access and stock segregation. Arms are adjustable on 2-inch centers. Each arm supports a full ton of bar or pipe type material.

Compact, too. Republic's Bar Rack Double-Face Starting Unit is 78″ high, 36″ wide, and 33″ deep at the base. Each unit consists of two uprights, three divider pans, and two cross braces. Available in either Olive Green or Gray baked-on enamel finish.

Republic's Berger Division is the leading manufacturer of all types of industrial racks and shelving, shop desks and work benches, materials handling equipment, and other specialty shop equipment.

If you have a shop storage or materials handling problem, call your Republic-Berger representative. Republic specialists will help you plan a practical, economical solution. Call, or write direct today.

For more facts Circle Reader Service Card numbers as follows:

REPUBLIC STEEL LOCKERS provide clean, attractive, dress-wash-and-change facilities. Big and roomy, interiors are spacious and well designed for convenience and good ventilation. Strong and sturdy, made of steel to assure complete protection of personal effects and tools. Bonderized, an exclusive feature that provides a superior base for the baked enamel finish. Restricts bumps, scratches, abrasions of everyday service to the site of the injury. Available in a wide selection of sizes, styles, and popular locking devices. Write today.

REPUBLIC'S BERGER DIVISION CONTRACT FACILITIES can help you solve fabricating and assembly problems. Berger will manufacture your product in volume runs—engineer, fabricate, finish, pack, and ship, all to your specifications. Your contract-fabricated products can be completely assembled with operating mechanisms installed. Sheet metal assemblies can be finished with a prime coat, ready for final finishing, assembly and packing at your plant. Write today. A Republic representative will review Berger's facilities with you.

STACK...STORE...SHIP...WITH REPUBLIC MATERIALS HANDLING EQUIPMENT. These strong, steel, rugged skid boxes deliver long, efficient service at low per-year cost. They feature corrugated box construction and heavy-duty stacking brackets for easy handling. Four-way space fork channels simplify handling in close-quarter restricted space. Stacking does not damage the boxes and stacking speeds materials handling. Let Republic's Berger Division Materials Handling Specialists solve your materials handling problems. Send coupon.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. FA-7896
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send information on the products checked below:

☐ Republic Bar Rack ☐ Republic Steel Lockers
☐ Contract Facilities ☐ Materials Handling Equipment
☐ Please have a Republic-Berger representative call

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

469 Bar Rack, 470 Steel Lockers, 471 Contract Facilities, 472 Materials Handling Equipment

"Here at AMERICAN CAN we're package

"Ours is a specialist's approach to packaging. It's been our business for 58 years, and we've built a reputation for knowing what it takes to design and produce a package that moves goods.

"It's the same with our OTIS Freight Elevators. We have 154 of them in 75 AMERICAN CAN COMPANY plants across the United States. They're a vital part of our production facilities that turn out millions of packages a day.

"As specialists, we knew from the start that the OTIS specialist's approach to Elevator Maintenance was the right way to assure continuous production."

What is the OTIS *specialist's approach* to elevator maintenance?
It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at the right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U. S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdowns to an absolute minimum and assure the highest possible safety.

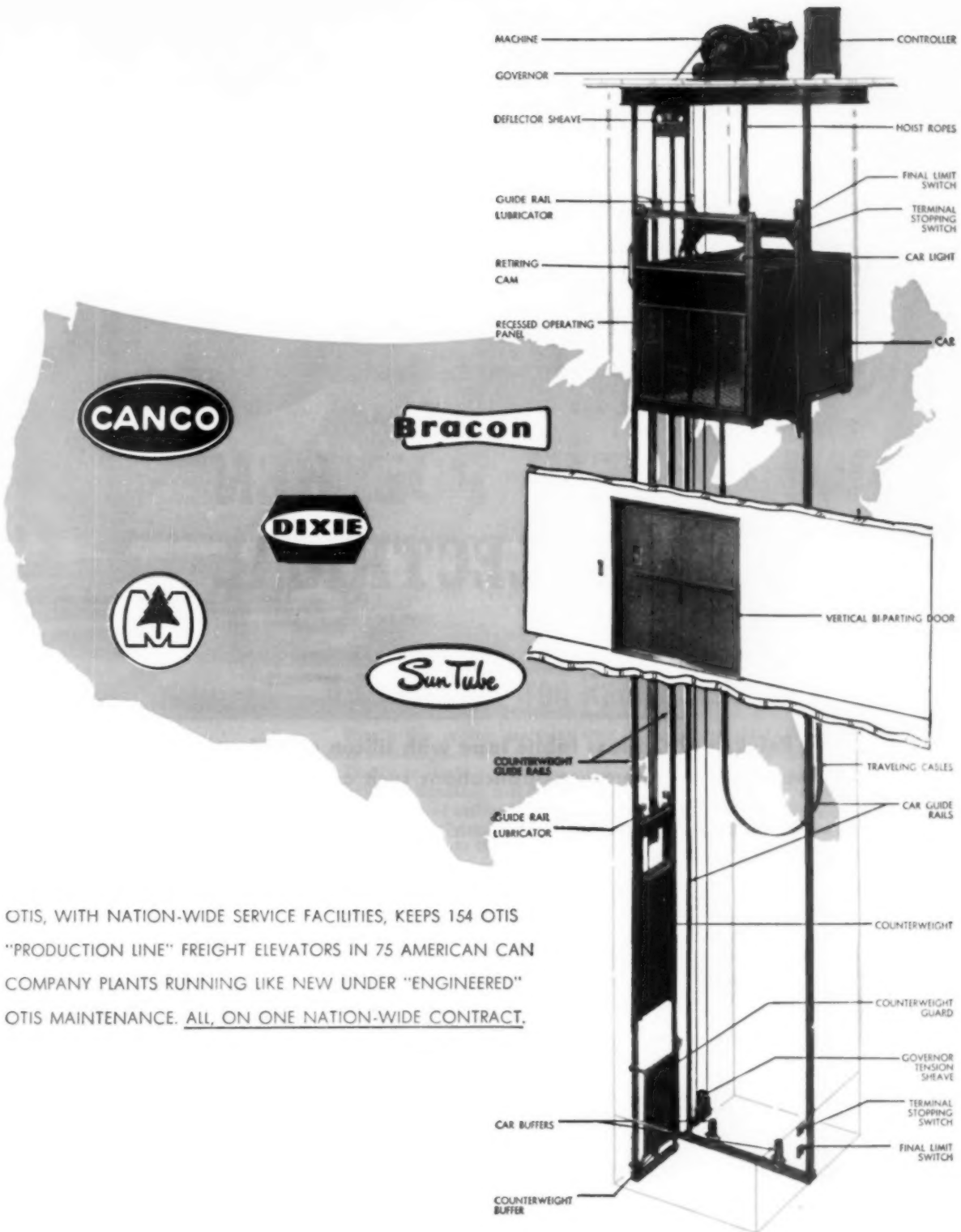
freight elevator maintenance

ASSURES CONTINUOUS PRODUCTION

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

FACTORY

men . . . not elevator maintenance men"



OTIS, WITH NATION-WIDE SERVICE FACILITIES, KEEPS 154 OTIS "PRODUCTION LINE" FREIGHT ELEVATORS IN 75 AMERICAN CAN COMPANY PLANTS RUNNING LIKE NEW UNDER "ENGINEERED" OTIS MAINTENANCE. ALL, ON ONE NATION-WIDE CONTRACT.

NOW! 4 NEW POLYKEN THERMO-ELECTRICAL TAPES

New! Polyken #292 glass fabric tape with silicon adhesive for use in high-temperature applications such as jet aircraft.

Four new tapes—three thermo-setting, one thermo-plastic—have been added to the Polyken line.

That means you can now get a Polyken tape for almost any electrical use you can think of. No more need to search among several manufacturers.

Nice to know, too, that now all Polyken tapes can be assorted for quantity discounts.

Polyken . . . the brand with half a century of scientific research and proved performance behind it. Find out what it can do for you.

Polyken representatives are among the industry's best trained technicians in the use and application of industrial tapes. They are ready to help you. Check with the Polyken Industrial Tape Distributor nearest you. Look in the phone book under "Tapes", or write to Polyken Sales Division, 309 W. Jackson Blvd., Chicago 6, Illinois. (In Canada, write Polyken, Curity Ave., Toronto.)

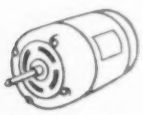
Find Your Nearest Distributor . . . In The 'Yellow Pages'

Polyken®

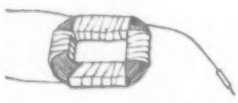
INDUSTRIAL TAPES

THE KENDALL COMPANY

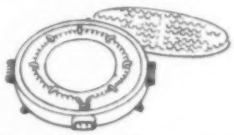
Polyken Sales Division



New! Polyken #158 cotton-backed electrical thermo-setting tape. Used in electric motor construction, etc.



New! Polyken #154 acetate cloth-backed thermo-setting tape, used for small gauge coil winding, etc.



New! Polyken #293 glass cloth-backed electrical thermo-setting tape is used for electrical appliances, etc.

INDUSTRIAL TAPES • PLASTIC FILMS

• PROTECTIVE COATINGS

For more facts Circle 474 on Reader Service Card

For more facts Circle 475 on Reader Service Card ➤

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company

High Impact Resistance At Sub-Zero Temperatures With "Mn" Wrought Iron

In many low temperature services, the possibility of brittle failure poses knotty problems for design and maintenance men.

That's why we have developed Mn (Manganese) Wrought Iron.

This brand new specialty wrought iron offers high impact resistance at sub-zero temperatures, coupled with the excellent corrosion-resistance and weldability of 4-D Wrought Iron.

Costing less initially than many steels, Mn Wrought Iron is available now in pipe, plate and other forms. This new material is especially well suited for such low temperature services as tanks and process piping in the refrigeration and petrochemical industries.

Inquiries regarding this specialty wrought iron will receive immediate attention and a prompt reply.

60" O.D. Wrought Iron pipe being fabricated in above photo, now serves as a water supply line to bring raw river water to a large chemical plant in Louisiana. 637 tons of ⅜" and ⅞" Wrought Iron plate were fabricated into 48" and 60" O.D. pipe for this plant.

Byers PVC Passes 2500-hr. Abrasive Slurry Test

This test sample of Byers Type I PVC (polyvinyl chloride) pipe reveals the smooth inside surface of the pipe to be completely unaffected by severe abrasive action.

The Byers PVC line from which this sample was cut was in service for 2500 hours carrying a liquid slurry of 50-70% sandstone of –100 mesh. For 500 hours of the total service time, the sandstone was in a 5% sulphuric acid solution instead of water. This was a recirculation line for underflow from a thickener tank. Operating temperatures varied from 40°F to 85°F.

Costly Protective Coating for O.D. Piping? 4-D Wrought Iron Rarely Needs It

Here's the piping material that does its own job.

Costly protective coatings which complicate handling, installation and maintenance of ordinary piping materials, are rarely needed with corrosion-resistant 4-D Wrought Iron.

Thousands of glasslike iron silicate fibers laced throughout every particle of 4-D actually retard pitting action. They force the corrosion to spread—evenly—and form a tight, protective coating over the entire surface of the metal.

Easily bent and welded

Fabrication is no problem, either. 4-D Wrought Iron can be readily formed—hot or cold—using the same general procedures and equipment as commonly employed for mild steel. And 4-D's *self-fluxing* action enables welders to easily produce sound, durable welds by any of the accepted welding methods.

Elasticity prevents cracking

Because of the metal's elasticity, soil shifts or sudden jars in hauling won't crack 4-D Wrought Iron. This in turn reduces time and trouble in trench preparation and back-filling. Elasticity, by the way, is one of the qualities that distinguishes Wrought Iron from Cast Iron.

No reliance on increased wall thicknesses

4-D Wrought Iron does not rely on excessive wall thicknesses to gain a toehold on corrosion. The lower weight ratio to ferrous substitutes is an interesting sidelight of the overall cost story.

From the preceding piping logic, you can draw your own conclusions regarding low-cost handling and installation. You can also steer your plant clear of costly downtime headaches. Just consider 4-D Wrought Iron piping for condenser cooling water lines. Salt water piping. Sewage outfall lines. Underground gas and waterlines. Salt and water well casing. Sump discharge lines.

Case history reports on all of these applications are available on request. Solutions to your specific problems may already repose in our files.

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company

4-D Wrought Iron pipe cooling systems are installed in all open hearth furnace dampers and frames produced at Blaw-Knox Company, Pittsburgh, Pa. They are subject to temperatures of 1400°F.

4-D Beats Heat, Clobbers Corrosion in Open Hearth

The combination of raw river water and intermittent changes in temperatures of heats is a tough assignment for piping in dampers on open hearth furnaces. Corrosion is the big threat.

That's why H. E. Stezel, Chief Engineer at Blaw-Knox, Pittsburgh, has standardized on 4-D Wrought Iron pipe in the manufacture of all water-cooled open hearth furnace equipment. He says Wrought Iron cooling piping lasts as long as the equipment itself.

Photo above shows the fabrication of a Blaw-Knox damper for reversing valves. 4-D Wrought Iron pipe is being welded to the damper.

10 Do's and Don'ts In Pipe Threading

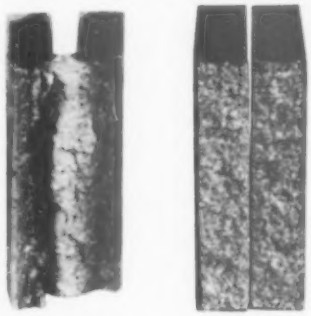
1. Clear slots of all dirt, gummy oil, chips, etc., when you change chasers.
2. When regrinding chasers, make sure that it is done by a competent craftsman who will accurately follow directions.
3. Cut off pipe ends squarely.
4. Cut the thread long enough to fully engage the threads in the fitting.
5. Never work with dull tools.
6. Don't put new or sharpened chasers in a worn stock if you want first-class results.
7. Never skimp on oil. Either in quality or quantity. Dies last longer, perform better when the oil is good and plentiful.
8. Don't use worn out chasers with impaired precision. Discard them.
9. Never fail to accurately center the die and tighten the thumb screws *with a wrench* in hand threading.
10. Don't forget to line up the pipe properly in the grips in machine threading.

Fire Underwriters Issue Water Tank Standards

The National Board of Fire Underwriters has issued a set of standards calling for the use of 4-D Wrought Iron for "filling," "inside" and "mill-use" piping in the construction and installation of water tanks. These services are the most corrosive in the tanks.

Same standards are also recommended by the National Fire Protection Association.

Here's the Difference



4-D Wrought Iron **Steel**

These are actual photographs of fractured pieces of 4-D Wrought Iron and steel. Note (left) how the fibrous structure of 4-D Wrought Iron differs from that of steel.

Many thousands of glasslike iron silicate fibers entrained in the pure base metal account for 4-D's unique structure. Duplicated in no other metal, this structural feature gives 4-D Wrought Iron its superior resistance to corrosion and fatigue stresses.

Literature Available

Literature listed below is available on request. For detailed information on specific applications, write Byers Engineering Service Department.

- *Wrought Iron for O.D. Piping*
- *4-D Wrought Iron: A New Dimension in Corrosion Control*
- *Mn Wrought Iron for High Impact Resistance at Sub-Zero Temperatures*
- *The Welding and Flame Cutting of Wrought Iron*
- *The Bending of Wrought Iron Plate*
- *The Threading of Wrought Iron Pipe*
- *Cold Drawn Wrought Iron Heat Exchanger and Condenser Tubes*
- *The Use of Wrought Iron in Steam Condensate Lines*

For additional information on 4-D Wrought Iron, contact Byers Division Offices in the cities listed below.

The maintenance and operating items appearing in BYERS GUIDE #3 were prepared by the Engineering Service Department of

A. M. BYERS COMPANY

Pittsburgh 22, Pennsylvania

ATLANTA • BOSTON • CHICAGO • HOUSTON • NEW YORK • PHILADELPHIA
PITTSBURGH • ST. LOUIS • SAN FRANCISCO • WASHINGTON, D. C.

4-D Wrought Iron is immediately available and may be obtained through established distributors of Wrought Iron Pipe. Plate, bar, and other flat rolled products may be ordered direct.

Corrosion costs you more than Wrought Iron

Printed in U.S.A.

RAYTHEON

Save Time and Money on Industrial Tubes

What the Raytheon-Machlett Story Means to You

BROADEST TUBE COVERAGE—Raytheon now offers the broadest line of industrial tubes and electronic hardware available anywhere... 1967 Raytheon types! You now get complete coverage on *all* your tube requirements through your Raytheon Distributor.

FASTER TUBE DELIVERY—Raytheon Distributors' inventory backup program has been extended to Machlett tubes. This means 24-hour local delivery of any tube when you need it. Simply list your tube requirements with your Raytheon Distributor.

ADDED ENGINEERING HELP—Raytheon field engineers are available to provide applications assistance on Raytheon and Machlett Tubes. Just call your Raytheon Distributor.

About Machlett Quality . . .

by John Hickey,
Raytheon Industrial Products Manager:

Merger of Machlett and Raytheon means that Raytheon Tube Distributors now offer fast local delivery of the finest quality power tubes for your industrial heating and communications sockets. Machlett Laboratories' people have a watchword: "What is good, stays good." They back it with 100 per cent inspection and the finest quality control in the industry. If you have equipment or designs which can use one of the more than 100 Raytheon-Machlett types, I believe you will see measurable improvement in performance, reliability, and tube life. Just specify "Raytheon-Machlett" as the brand, "Local Raytheon Distributor" as the supplier.

RAYTHEON

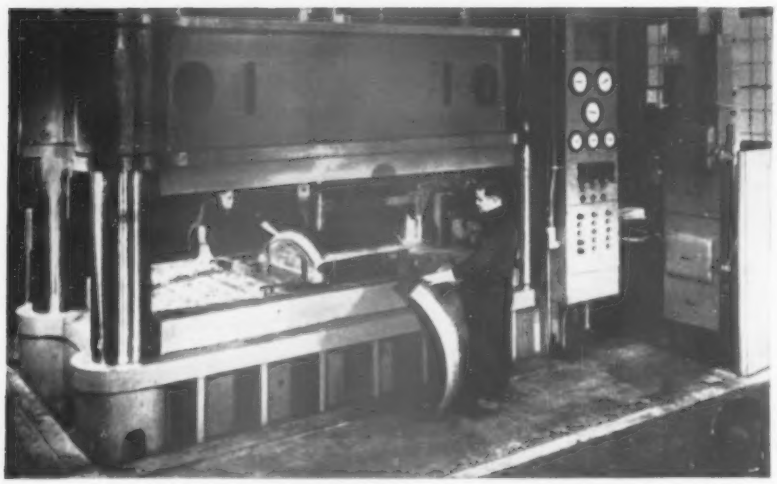
RAYTHEON DISTRIBUTORS SERVING KEY MARKETS INCLUDE:

Baltimore, Md.
Wholesale Radio Parts Company
Birmingham, Ala.
Forbes Distributing Company
Boston, Mass.
DeMambro Radio Supply Company
Burbank, Cal.
Valley Electronic Supply Company
Chicago, Ill.
Newark Electric Company
Cleveland, Ohio
Pioneer Electronic Supply Corporation
Denver, Colo.
Ward Terry & Company
Detroit, Mich.
Ferguson Electronic Supply Company
Inglewood, Cal.
Newark Electric Company
Kansas City, Mo.
Burstein-Applebee Company
Los Angeles, Cal.
Kierulff Electronics Corporation
Milwaukee, Wis.
Electronic Expeditors, Inc.
Mobile, Ala.
Forbes Electronic Distributors, Inc.
New York City
Arrow Electronics, Inc.
H. L. Dalis, Inc.
Milo Electronics Corporation
Oakland, Cal.
Elmar Electronics
Philadelphia, Pa.
Almo Radio Company
Phoenix, Ariz.
Radio Specialties & Appliance Corporation
Portland, Ore.
Lou Johnson Company
Tampa, Fla.
Thurow Distributors
Washington, D. C.
Electronic Wholesalers, Inc.

This is a partial listing only. Names of other Raytheon Industrial Distributors on request to Raytheon Distributor Products Division, 55 Chapel St., Newton 58, Mass.

RAYTHEON COMPANY • DISTRIBUTOR PRODUCTS DIVISION

Lubrication



PREMIUM HYDRAULIC OILS CAN MORE THAN PAY BACK THEIR INITIAL EXTRA COST

Laboratory experiments, exhaustive field tests and, finally, general industrial experience have conclusively proved the long-term economy of a premium hydraulic oil over even the best straight mineral oil.

What makes a premium oil different? Straight mineral oil is a highly refined product containing many good lubricating qualities. However, it may be subject to fairly rapid oxidation, and it foams persistently when agitated.

On the other hand, a premium hydraulic oil, like Texaco Regal Oil R&O, contains a number of additives specifically designed to minimize or eliminate the undesirable qualities of straight mineral oil, while retaining the good.

Importance of these qualities in a hydraulic system. Oxidation, rust and foam all breed trouble in hydraulic sytems, even though they may not be immediately apparent. Because Regal Oil R&O is specifically inhibited to guard against these dangers, you can expect four distinct areas of savings, in spite of higher initial cost, when you install this premium oil in your hydraulic equipment:

It saves man-hours. Because a premimum hydraulic oil is inhibited against oxidation and rust, it will not form sludge in the system or allow parts to corrode. This can more than double the intervals between scheduled overhauls, saving valuable maintenance man-hours.

It prevents production losses. By keeping hydraulic systems clean, Regal Oil R&O guards against those sudden, unexpected stoppages that halt production, are costly to overcome. Pumps and other parts last much longer, too.

It cuts rejects when used in production equipment. Regal Oil R&O is inhibited against foaming. And foam, which causes jerky operation, can be a large factor in ruined machine parts.

It reduces oil drains. Because Regal Oil R&O lasts longer than straight mineral oil, systems don't have to be refilled nearly so often. The savings on this one factor alone are often enough to counterbalance the higher initial cost of Regal Oil R&O.

Way found to coat steel concrete forms without wasting oil

How to coat steel concrete forms without wasting a large amount of the oil in run-off has always been a problem for manufacturers of concrete products.

One of the country's leading concrete pipe producers has now licked this problem by using a 50-50 mixture of diesel fuel and Texaco Stazon. Originally developed as a non drip product for textile mills, this unique Texaco lubricant clings just as well to steel forms. The pipe manufacturer reports that run-off has now been eliminated completely. The new mixture can be used in temperatures as low as 0°F and can be either sprayed or painted on the forms.

MOVIE OF THE MONTH

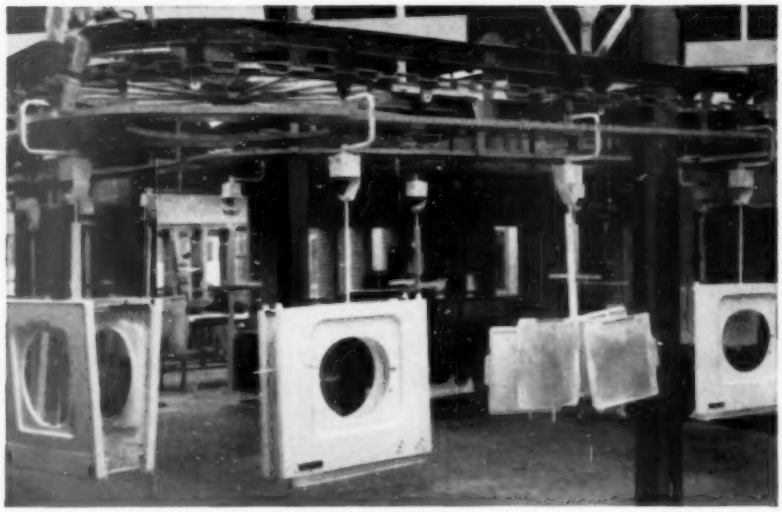
SEE...

"Shear Magic"

Texaco's new full-color film on the nature and uses of grease is a must-see feature for anyone interested in getting the most out of grease-lubricated equipment.

news

TEXACO REG. T.M.



How manufacturer eliminated rejects caused by flaking conveyor

Flakes of rust dropping from the plant-wide conveyor system onto newly painted finishes were causing an unhealthy 10% reject rate for one manufacturer of large household appliances. His problem: the conveyor traveled through areas where the humidity was high, as well as through baking ovens. These widely varying heat and moisture conditions were too much for the conveyor finish.

Texaco called in. Although the problem was not directly associated with lubrication, the visiting Texaco Lubrication Engineer heard about it and recommended having the conveyor sprayed with Texaco Rustproof Compound L. This versatile Texaco product withstood both the excessive humidity and the high temperatures that the conveyor encountered in its travels around the plant. Rusting ceased and rejects of the finished product dropped drastically from 10% to a normal 1½%.

New Seagram building gets cutting oil bath

In one of the most unusual uses for a petroleum product yet, the Seagram building, on New York's Park Avenue, recently employed Texaco Sultex Cutting Oil as a bath for its unique bronze facade. The reason: a dark "antique" surface on the metal was wanted, and the sulphur in Sultex reacted nicely with the bronze to give the desired effect of age!

NEW PRODUCT NEWS

New tool joint compound resists pressure used in joining pipes, and joints can be broken without using much more torque than was applied in making them up. Primarily for use in oil fields. Makes an excellent thread lubricant anywhere where cost is a big consideration.

Lube facts to be aired for metal-working plants

The story of many of the less common, "odds and ends" lubricants used in metalworking will be told in the July issue of "Lubrication" magazine. The editors plan to discuss roll oils (both ferrous and non-ferrous), lubricants for hot punching, deep press drawing, wire drawing and the like. To be sure you're on the list to get this important issue, mail coupon.

Clip Coupon To Company Letterhead

TEXACO INC., Dept. F-LN-21

135 East 42nd Street
New York 17, N. Y.

Dear Sirs:

☐ I am interested in seeing "Shear Magic".

I would like a free copy of

☐ Lubrication Magazine

☐ Management Practices that Control Costs via Organized Lubrication.

Name _____ Title _____

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City _____ State _____

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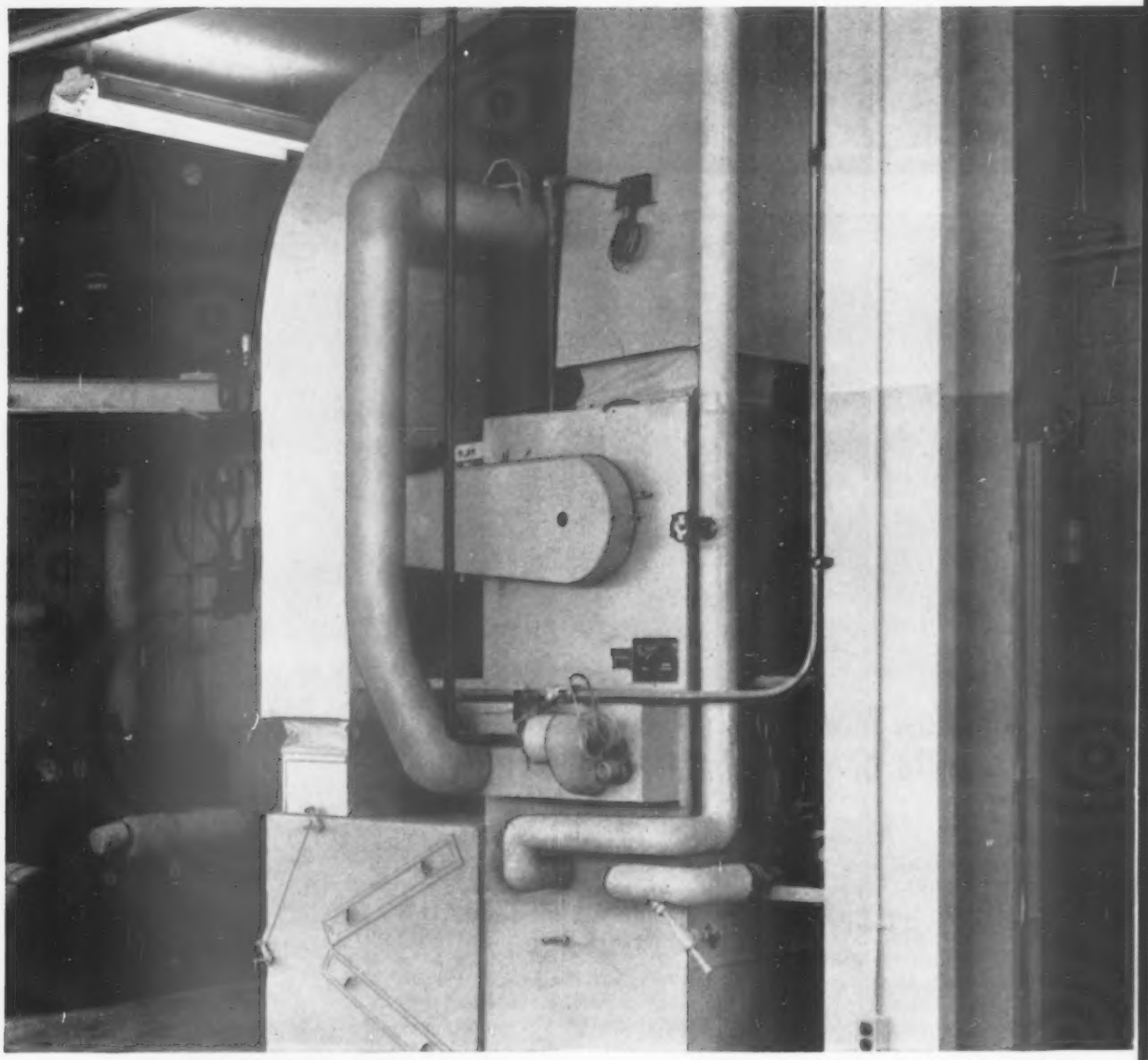
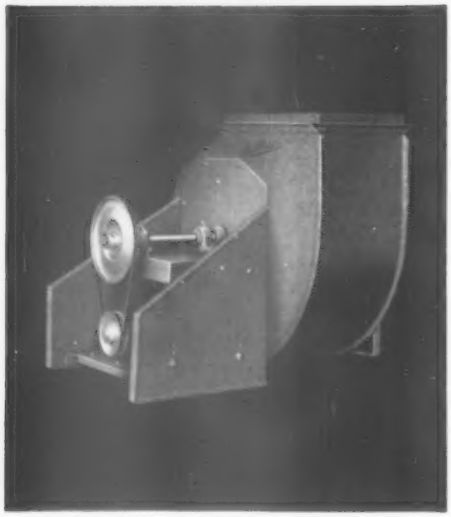


Above: "Buffalo" Central System Air Conditioning Cabinet

Below: "Buffalo" Belted Vent Sets



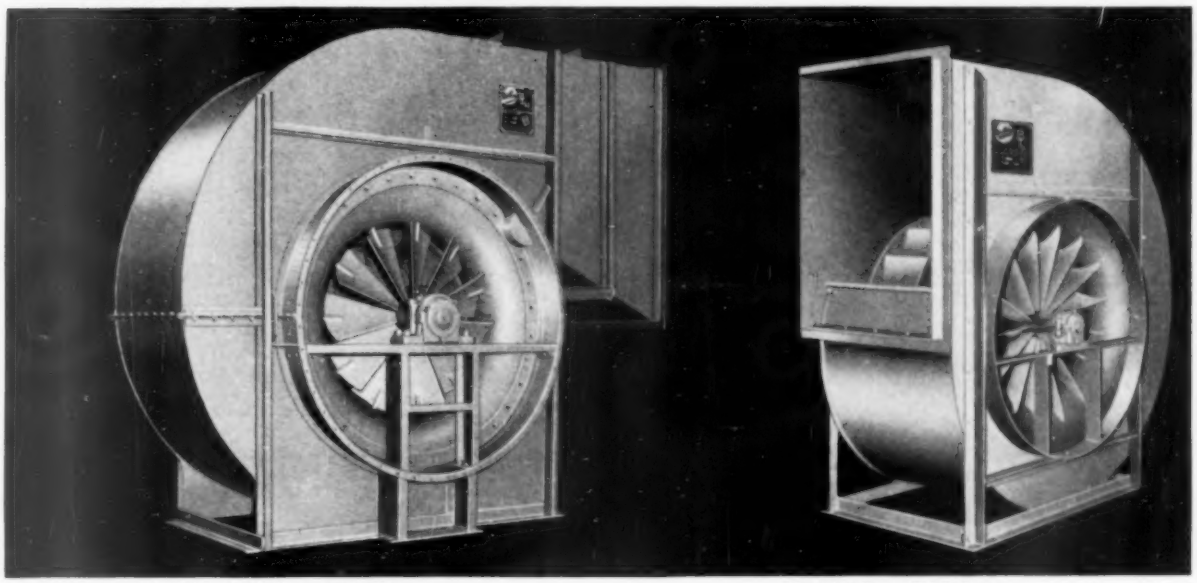
IMPROVED PRODUCTIVITY

THROUGH MORE EFFICIENT USE OF YOUR PLANT AIR WITH "BUFFALO" FANS

Need fans for small, independent systems? For larger systems with variable requirements? For separate systems in different parts of your plant? Then "Buffalo" Belted Vent Sets are your low-cost answer. These quiet, compact, lightweight "packages" are easy to install. Can be used indoors or outdoors; as multiple units, or installed separately to increase your present ventilating facilities. Capacity can be quickly changed to meet future requirements. Available in capacities from 500 to 20,000 CFM. Write for Bulletin 3720-A.

You're assured of optimum performance in Classes III and IV service by the "Buffalo" Type "BLH" Fan. The "BLH" delivers extremely high mechanical efficiencies over a very broad operating range. Ultra-quiet operation and a minimum of turbulence are provided by the smooth inlet bell, matching shroud, directional inlet vanes and non-overloading backward curved blades. The divergent outlet of the "BLH" results in improved pressure distribution at the outlet. Write for Bulletin F-201.

For applications in Classes I and II, the leading choice is the "Buffalo" Type "BL" Fan. It combines non-overloading characteristics with quiet, stable output from free delivery to shutoff. Minimum turbulence is afforded by the smoothly-curved inlet bell with directional guide vanes and matching shroud. Backward curved blades provide peak efficiency. Wheels are factory tested and balanced to achieve performance that is almost vibration-free. Smoothest possible air flow is further enhanced by the carefully-shaped scroll of the wheel-suited housing. Write for Bulletin F-104.



"Buffalo" Type "BLH" Fans
Capacities range from 4,000 to 500,000 CFM

"Buffalo" Type "BL" Fans
Capacities: 600 to 500,000 CFM

Your plant air can be a profitable asset or a costly liability — depending on how you use it. Improved ventilation, heating and cooling can build morale, reduce absenteeism and boost production through increased output per worker. Certain manufacturing operations may require process air conditioning for accurate control of temperature, humidity and dust-free conditions. It will pay you to re-evaluate your present ventilation and/or air conditioning facilities in terms of modern efficiency.

Perhaps you're thinking of modernizing. If your fans are 15-20 years old or more, installation of new "Buffalo" Fans may bring you a welcome increase in the efficiency of your air moving equipment, reducing fan operating costs.

Or perhaps you're thinking of installing a new system. Then you will most certainly be interested in what "Buffalo" equipment can do for your installation. There is a "Buffalo" Fan to suit your every air moving need. And the "Buffalo" reputation for peak performance, economy, dependability and a long life of maintenance-free operation is well-known to plant engineers throughout the world.

Fill your needs from the complete "Buffalo" line — backed by more than 80 years of engineering experience. Your nearby "Buffalo" engineering representative will be glad to assist. Call on him for complete information, or write us direct.

"Buffalo" Fans bring you the "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.

BUFFALO FORGE COMPANY

"Buffalo"

BUFFALO, N. Y.

Buffalo Pumps Division, Buffalo, N. Y. • Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

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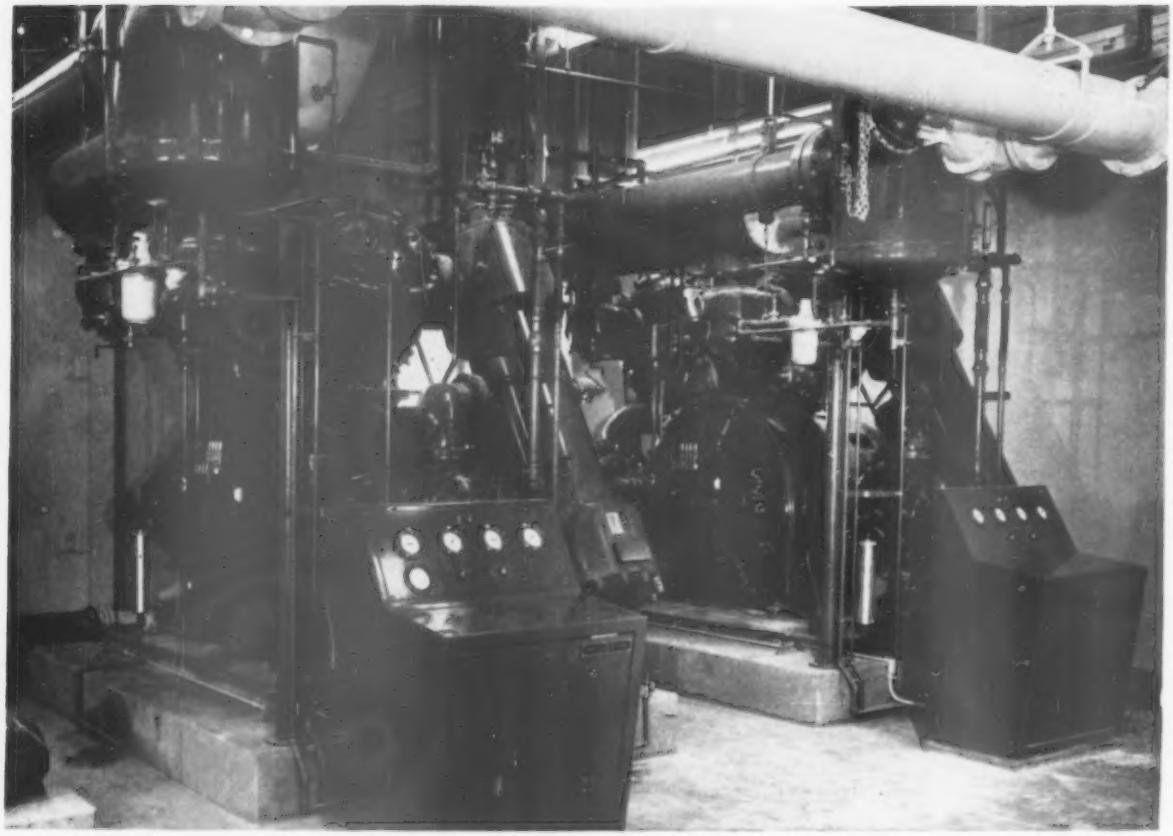

AIR POWER STRONG ENOUGH TO DESTROY METAL PARTS AT BOEING AIRPLANE CO.

In a special sonic test lab at Boeing's new developmental center in Seattle are a pair of air horns powerful enough to destroy the walls of Jericho. These horns are used to test things to destruction with sound waves as great as 170 decibels.

The horns are powered by two Joy WN-224 compressors of 400 horsepower each, delivering a total of 4800 cfm. Two important points were considered in the selection of these compressors . . . smooth-running characteristics, and size of the machine.

Much of Boeing's developmental center rests on foundation piles and 180,000 cubic yards of fill pumped from a nearby river. Since the WN-224 is inherently smooth running, the compressors required only a simple slab foundation —even on the filled ground.

As for size, the WN-224's were shipped as a package unit. This is possible because of the compressor's compact semi-radial design.

There are ten horsepower ratings of the WN-224, ranging from 350 to 1250 hp, 2400 to 7400 cfm. Get complete information on the WN-224, the smoothest running compressor in its field. Write for free bulletin 306-12.

WSW I 7535-306

AIR MOVING EQUIPMENT FOR ALL INDUSTRY

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario

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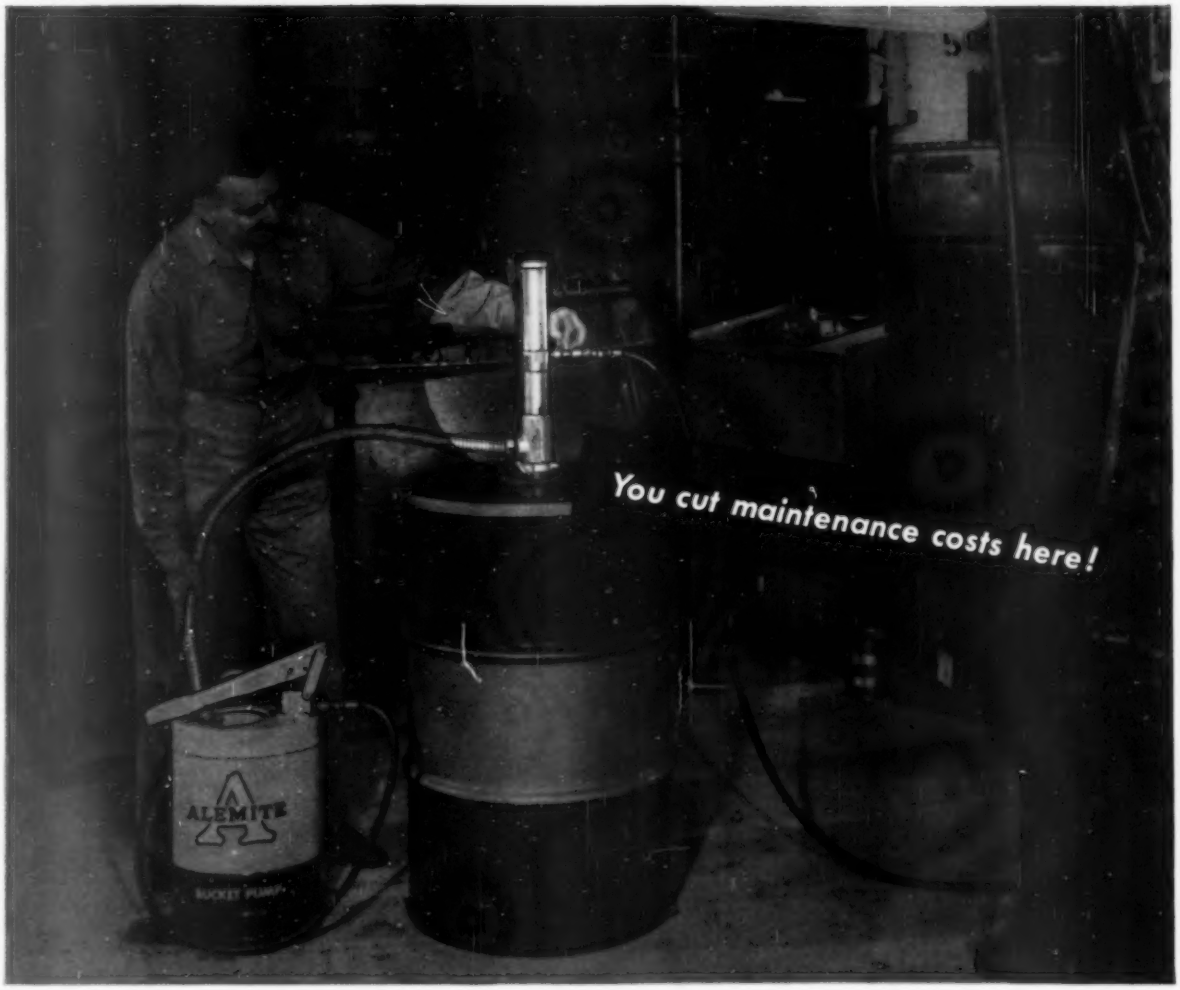

Alemite Power Transfer of Lubricants Is 63% Faster Than Hand Method!

Wherever old-fashioned hand methods are used to transfer lubricants from original drums to other containers, time and money are wasted!

This high-speed, air-powered Alemite Transfer Pump transfers 37 pounds of pressure gun grease per minute, direct from original drum to loader pump, bucket pump or power gun. This gives you 63% faster transfer than by hand! And lubricant is always sealed—fully protected against mess, waste and contamination.

Pump also handles alcohol, cutting oils, kerosene—almost any non-corrosive, non-abrasive fluid used by the drum. Synthetic rubber air piston requires no oiling. Fully adjustable delivery rate . . . weighs only 15½ pounds!

Step up to fast-moving, time-saving transfer of fluid and semi-solid materials. Check Alemite's complete line of lubrication equipment for industry.

Symbol of SW Excellence

ALEMITE
DIVISION
STEWART-WARNER
CORPORATION

1850 Diversey Parkway, Chicago 14, Illinois

MAIL COUPON FOR COMPLETE INFORMATION!

Alemite, Dept. E-79
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Please send me your complete catalog of Alemite industrial lubrication equipment.

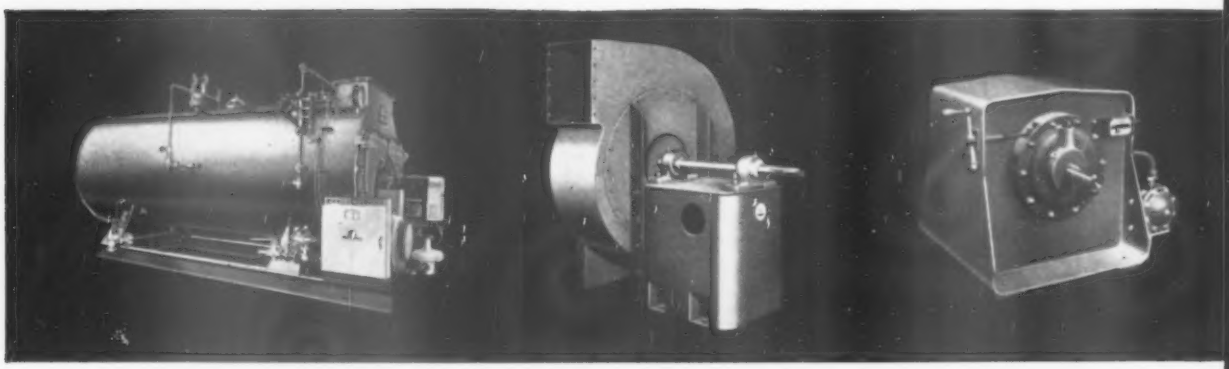
Name .....

Company .....

Address .....

City ..... Zone ..... State .....

Ready for



Firebox, scotch-type steel boilers and package units for heat, power, steam.

Industrial fans with wheel types for handling air, gases, materials, shavings.

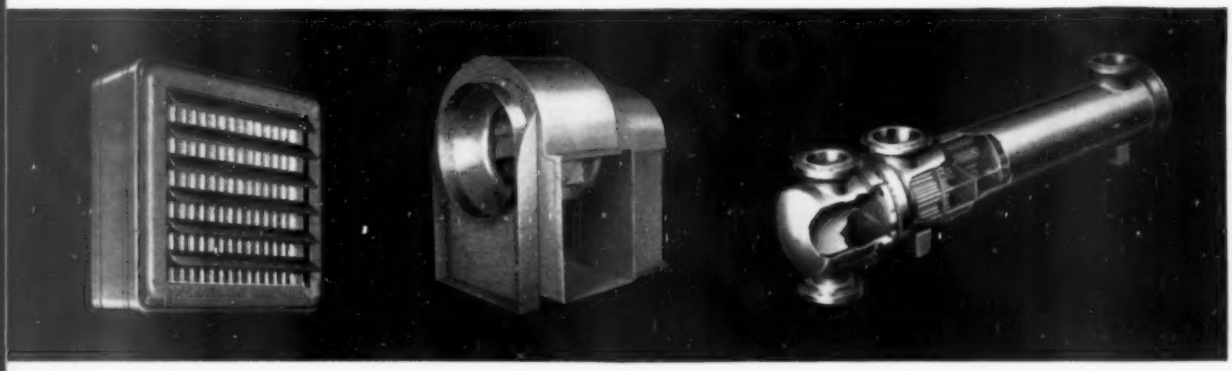
Fluid drives for stepless, adjustable-speed control of driven machinery.

One call for all

bids on plant equipment?

Be sure one of them is from AMERICAN-Standard Industrial Division if your job involves heating, air conditioning, air handling, heat transfer, or fluid drives

HERE'S WHY: You get *one-source responsibility* for quality and performance in equipment designed, engineered, and manufactured to work together. For, the new Industrial Division combines the engineering backgrounds and product lines of three American-Standard* divisions—American Blower, Ross Heat Exchanger, and Kewanee Boiler. There are engineer-staffed offices in all principal cities to work closely with architects, consulting engineers, and contractors. For complete information, contact the one nearest you. American-Standard Industrial Division, Detroit 32, Michigan. In Canada: American-Standard Products (Canada) Limited, Toronto, Ontario.



Vertical and horizontal unit heaters for steam or hot water; also gas-fired.

Self-contained ventilating units for supply or exhaust in duct systems.

Heat exchangers, condensers, and feedwater heaters for every requirement.

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AMERICAN-Standard
INDUSTRIAL DIVISION

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announcing the most significant hoist development in 25 years!

NEW BALANCED P&H HEVI-LIFT ELECTRIC HOISTS

2,000 to 50,000 pound capacities

a new concept in the application of power and control to hoisting operations

What Is Balanced Design?

Balanced Design means that each part in the new P&H Hevi-Lift hoist has been balanced or matched with every other part for strength, temperature and performance characteristics. *There are no weak parts!* Each part is as strong and dependable as every other part.

As a result, in the new "Balanced Design" P&H Hevi-Lift, no single part is a limiting factor on overall hoist performance. Even under severe duty cycles, motor, gearing and brakes continue to function as designed without excess heating or abnormal wear. It is this unique balance of design and stability of performance that gives the new hoists their name — "Balanced Design P&H Hevi-Lifts."

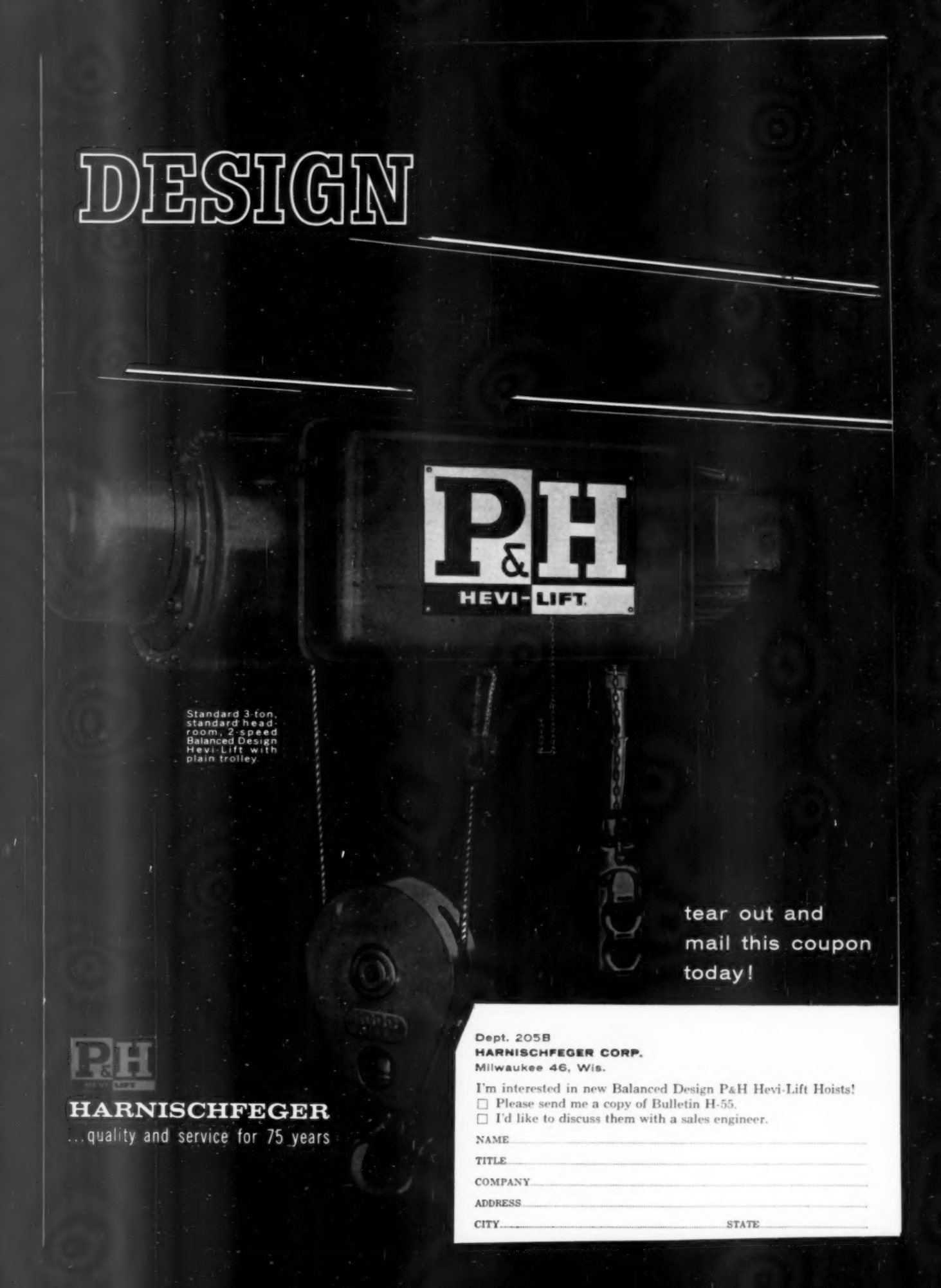
What will new Balanced Design P&H Hevi-Lifts do for you? For one thing, you'll never again be plagued with petty hoist breakdowns that cost pennies to repair, but mean dollars in lost production. Simply stated, *the new Hevi-Lift will stand up longer under heavier duty cycles with less maintenance than any other hoist made today!*

Check These Features

The new Balanced Design P&H Hevi-Lifts are specifically built to provide the solution to every previously existing hoist operating and maintenance problem. For example, they feature: 1) Totally enclosed, weatherproof and dustproof motor brakes and controls to eliminate maintenance worries, 2) Self-adjusting load brake with extra large linings, oil bath lubricated and cooled, that *never* requires tightening or tinkering, 3) Extra-large, leak-proof design gearcase, with all gears splash lubricated, 4) Lifetime lubrication of all components — there's not a single grease fitting on a Hevi-Lift, and no lubrication headache, 5) Extra-large low-pressure motor brake has only a short 1/32" stroke. There's no punishing hammer action, no pins, linkage or levers—and no need for cooling fans, 6) Alloy steel involute splined shafts and gears of machine tool quality for extra low tooth pressure, long life.

Get the whole story—see the complete line—in Bulletin H-55. Just clip the coupon on the other page and mail it in! Dept. 205B, Harnischfeger Corp., Milwaukee 46, Wisconsin.

DESIGN



Standard 3-ton, standard headroom, 2-speed Balanced Design Hevi-Lift with plain trolley.

tear out and mail this coupon today!

P&H

HARNISCHFEGER

...quality and service for 75 years

Dept. 205B
HARNISCHFEGER CORP.
Milwaukee 46, Wis.

I'm interested in new Balanced Design P&H Hevi-Lift Hoists!

☐ Please send me a copy of Bulletin H-55.
☐ I'd like to discuss them with a sales engineer.

NAME _____

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COMPANY _____

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It's a Snap

The Fenwal 541 Temperature Indicator Controller

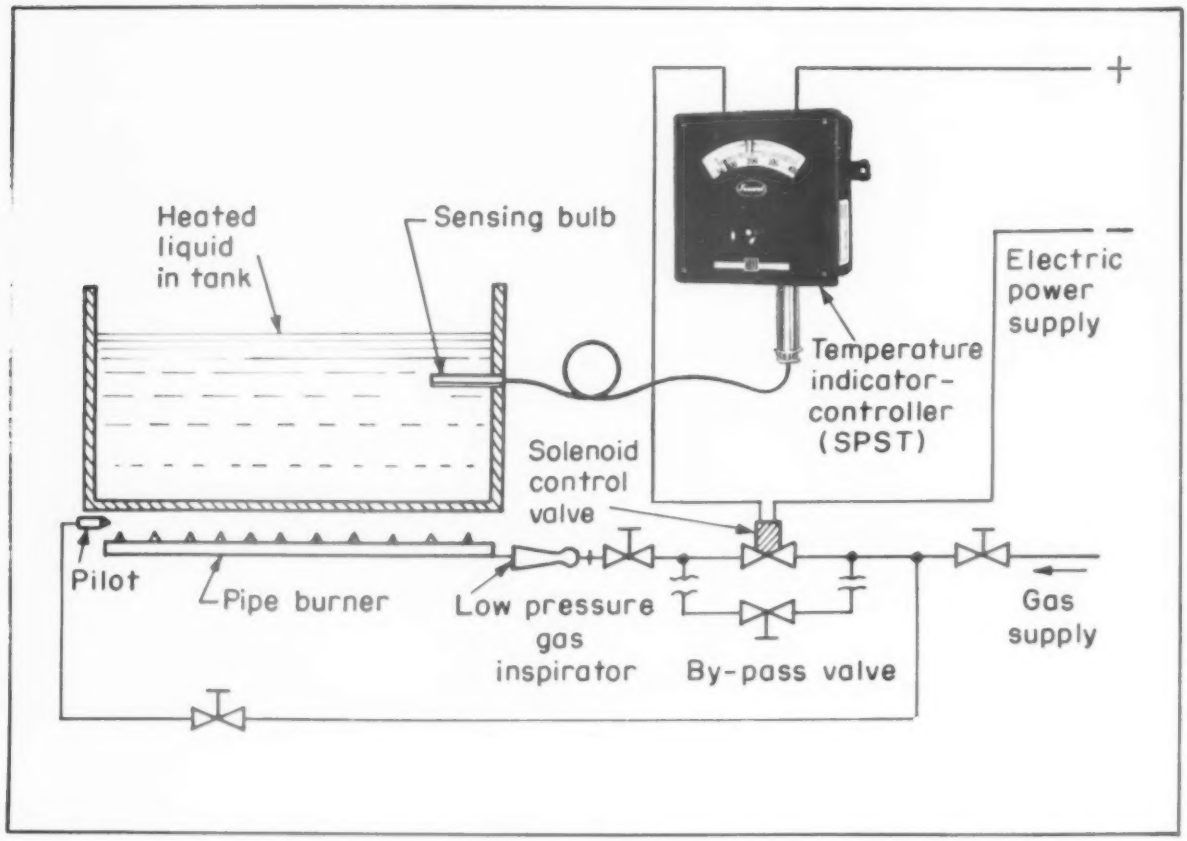
is simple to install, operate, and maintain!

There's no easier way to be sure of precise, economical heat control in simple process systems than with a Fenwal 541 Temperature Indicator Controller. Installs in minutes . . . sets with a turn of the control knob . . . control switches can be replaced without even disturbing internal mechanism. *You can't go wrong!*

Installation on atmospheric gas burner (below) is typical. The 541 is available with a wide choice of bulb styles and hundreds of combinations to meet widely varying process requirements. Welded steel case protects against splashing and dust. All moving parts operate in opposition . . . compensate for wear and keep accuracy high. *You don't have to baby this controller!*

Available in 5 different temperature ranges within the span of −150° to +700°F, the 541 can control as many as four circuits simultaneously! Current ratings: 15 and 20A-125-250VAC; .50A-125VDC; .25A-250VAC. For full details see your Fenwal Distributor. For application data sheets, write Fenwal Incorporated, 257 Pleasant Street, Ashland, Massachusetts.

The Fenwal 541 Temperature Indicator Controller provides economical, highly accurate control of heat in this atmospheric gas burner system. Rugged liquid filled sensing bulb and capillary tube activate control of gas supply.



ANOTHER EXAMPLE OF HOW **Fenwal** CONTROLS TEMPERATURE . . . PRECISELY

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titeflex*

flexible metal hose satisfies your plant's needs

3 ways

1. INNERCORE TO TRANSFER ANY FLUID

Of high quality metals and alloys . . . in many different sizes . . . strengths . . . and flexibilities . . . for the toughest jobs.

2. WIRE BRAIDING FOR GREAT STRENGTH

TITEFLEX weaves round wire, metal ribbon, or combinations of both into high quality braid coverings. Weaves and metals used match each hose's needs in flexibility, high pressure, abrasion resistance.

3. FITTINGS

Designed and precision made to fit both hose and connections perfectly.

*T.M. of Titeflex, Inc., pat. pending

Companies specify TITEFLEX metal hose for good reason. From end to end . . . inside and out . . . it's made *right* in our own plant. Rigid quality control makes for top performance. Superb TITEFLEX engineering, famous in the field, produces metal hose that is lighter, more flexible, with a smaller bending radius. More and more companies look to TITEFLEX for dependability and engineered help for their applications.

Your TITEFLEX distributor is in the Yellow Pages, or write direct for complete information and specifications.

titeflex

titeflex inc. springfield mass. PACIFIC DIVISION • SANTA MONICA • CALIFORNIA

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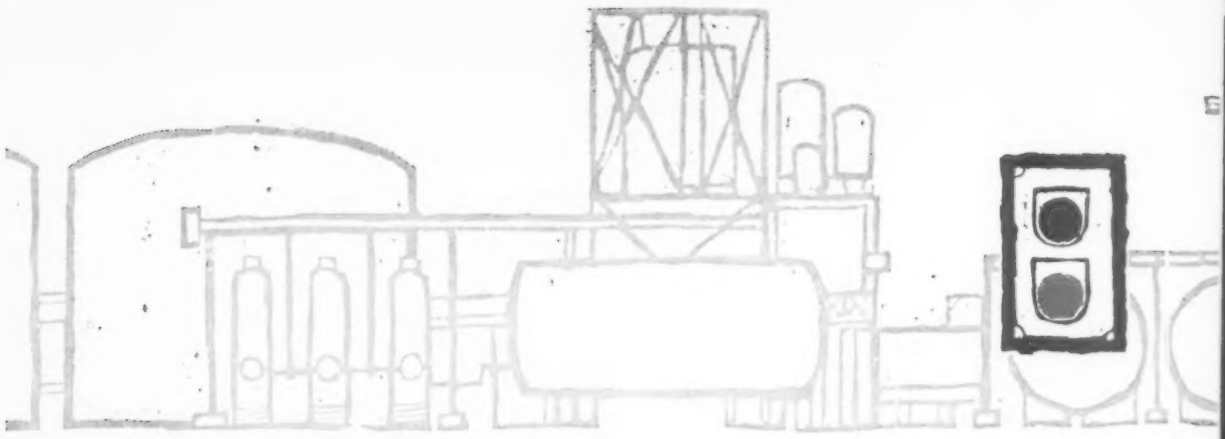
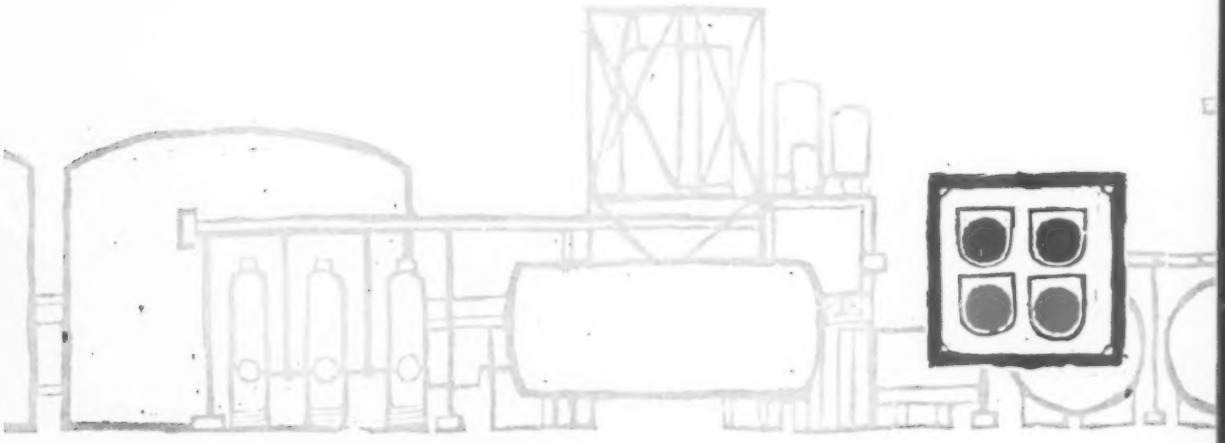
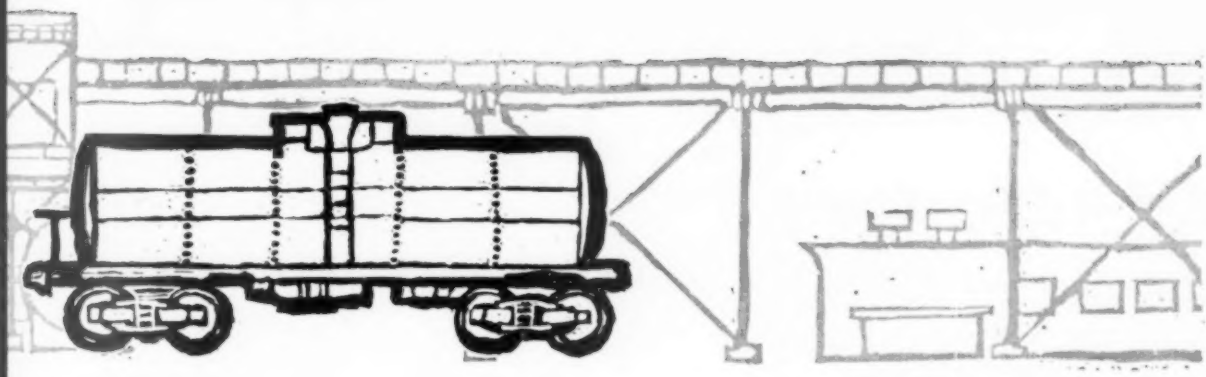


In 1956, with this plant, Olin Mathieson

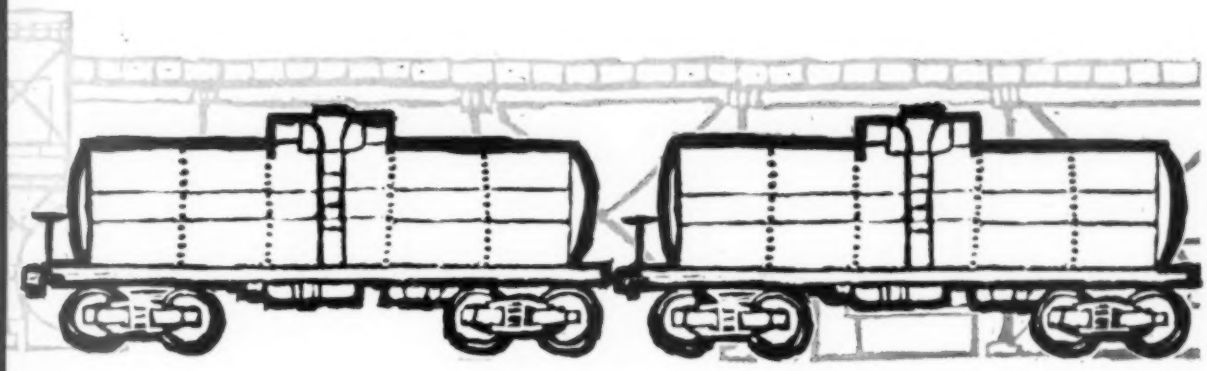


Now, by doubling use of electric power, they

POWER-UP FOR PROFIT



produced this much caustic soda and chlorine



produce twice as much with reduced overhead costs

ELECTRICALLY

. . . POWER-UP is a Westinghouse program to help you increase profits through greater productivity. In your plant, it may be a materials handling system, higher capacity machinery, or a more productive environment through higher lighting levels and air conditioning. One thing is certain—whether or not you earn satisfactory profits in the '60s will depend on your making maximum use of low-cost kilowatthours.

A production increase of 40% is forecast for 1965. Be sure—like Olin Mathieson—that your electrical equipment is engineered to produce profits as well as output. Call your Westinghouse representative. He can tell you the electrical steps you can take *now* to start a Power-Up program in your plant. J-96113

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

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5 Reasons why it pays to buy from Ryerson

MOST DIVERSIFIED STOCKS—Ryerson inventories include by far the widest range of types, shapes and sizes available anywhere.

FAST SERVICE—A combination of varied stocks, modern equipment and an experienced staff means stepped-up processing for *regular requirements* and unparalleled ability to meet the most urgent *emergency needs.*

HIGHEST QUALITY—New quality-control standards, completely detailed and published, govern every aspect of Ryerson specifications and operations. Here is steel that's *certified* for dependable performance, and cut to your most *exacting* requirements.

TECHNICAL HELP—Experienced specialists, well qualified to work with you on problems of replacement and selection, help you achieve optimum value for your steel-buying dollar.

INTEGRITY—The nationally recognized leader in its field, Ryerson values your patronage much too highly to sacrifice your long-term good will for any immediate gain. 117 years of fair dealing—at your service.

LET RYERSON CARRY YOUR INVENTORY—Whatever your maintenance steel needs, you get one-call, one-order delivery at Ryerson. Order today.

RYERSON CERTIFIED QUALITY

RYERSON STEEL®

Member of the INLAND Steel Family

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

NATION'S MOST COMPLETE SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST

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FACTORY . . . PRESS TIME REPORT • JULY 1959

Looking Ahead in Business

You can expect business to continue at a pretty brisk pace in the second half of the year. Developments of recent weeks should calm any fears about business levels in the near future.

Industrial output continues to set new highs. The index of industrial production is now at 152—a couple of points above last month and almost 20% above a year ago. Although production won't be climbing in the next few months, it certainly won't slide backward very long.

•

One solid force behind the high levels of output is the steady growth of personal income. Remember, consumer spending was largely responsible for limiting the downswing in 1958. Because personal income didn't shrink in line with falling industrial production, consumers were able to continue buying all except the real big-ticket items.

The steady level of consumer buying caused business to swing back rapidly. The way personal income has risen in recent months is grounds for optimism about business activity in the months to come.

Latest reports from the Commerce Department show personal income—mostly the income of wage and salary employees—is now at an annual rate of more than $376-billion. That's a big improvement over last month's figure and more than $25-billion higher than last year. It's easy to see why consumers are in a mood for buying new autos and other durables.

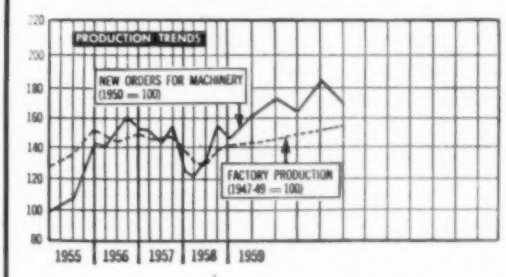
•

The boost in personal income is largely due to the pick-up in employment over the past three months.

Unemployment fell by almost 250,000 last month, bringing the total unemployed figure down to less than 5% of the working force. Factory employment, which usually dips at this time of year, increased by 100,000 in May.

Meanwhile the workweek in manufacturing industries has continued to rise. Workers in manufacturing are now working a longer workweek than at any time since 1955. And factory workers' weekly earnings have reached new highs.

FACTORY FIGURES OF THE MONTH



Indicator	May 1959[P]	Apr. 1959[r]	May 1958
New Orders for Machinery (exc. elec.)[1]	171.0	187.0	129.0
Contracts for Industrial Construction[2]	112.0	127.0	87.0
Factory Production[3]	155.0	153.0	130.0
Consumers' Prices (cost of living)[4]	123.9	123.9	123.6
Industrial Prices (materials, supplies)[4]	119.8	120.0	119.5
Manufacturing Employment (millions)[5]	16.1	16.0	15.0
Total Employment (millions)[5]	66.0	65.0	64.1
Unemployment (millions)[5]	3.4	3.6	4.9

P = preliminary r = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of the Census.

Looking at the steady growth of production and consumption, business men are reconsidering their capital-spending plans. Latest Department of Commerce-SEC quarterly survey indicates capital-spending budgets up from three months ago.

•

This cheery outlook doesn't mean that business can relax for the next six months. For one thing, demand for steel will slow in the third quarter. And price rises may grow from the steel settlement.

Another development that might be troublesome is the build-up of new-car inventories. Car dealers will be going into the late summer months with almost a million new cars on hand.

But there aren't any major stumbling blocks in sight for the second half. Industrial production will bounce back by the year-end and Gross National Product will hit a rate of $485-billion.

Ideas of the Month

Painting again? Don't wave a brush or roll a roller till you've consulted a chart (*Wilbur & Williams*) that tells you which product to use for your particular paint problem—and what it'll cost per sq. ft. **(312)**

No couplings, no troublesome splices with new large-diameter hose (*Goodyear*). Continuous process turns it out in 2- to 8-in. ID—in any length practical to transport. Will handle any chemical or fuel. **(313)**

You save space with vertical files—and we especially like Ease-O (*Fraser & Johnston*) for its disappearing doors and nylon bearings. **(314)**

Moving parts of new pump (*Randolph*) are never touched by material being pumped. Instead, flexible tube passes through pump body, is exposed to squeegee action of double rotor. Sounds like the doctor's prescription for anyone who handles corrosives, abrasive slurries, sterile solutions, etc. **(315)**

Assemblor is a nifty all-steel job (*Hamilton*) that can be changed in minutes from drafting table to office desk, and back again. **(316)**

Here's a wrench (*Schick Products*) forged from aluminum bar stock and a heck of a lot lighter than the regular kind. Replaceable steel jaws. Six sizes—from 10 to 48 in. long—with jaw capacities from 1½ to 6 in. **(317)**

Ought to see what a dry-process pulping mill (*Pacific Paper Cutter*) will do to classified matter. No water. No mess. **(318)**

Every fastener user should have a 24-page corrosion guide (*Harper*) that shows approximate physical and mechanical properties of commonly used metals and their suitability for manufacturing applications. **(319)**

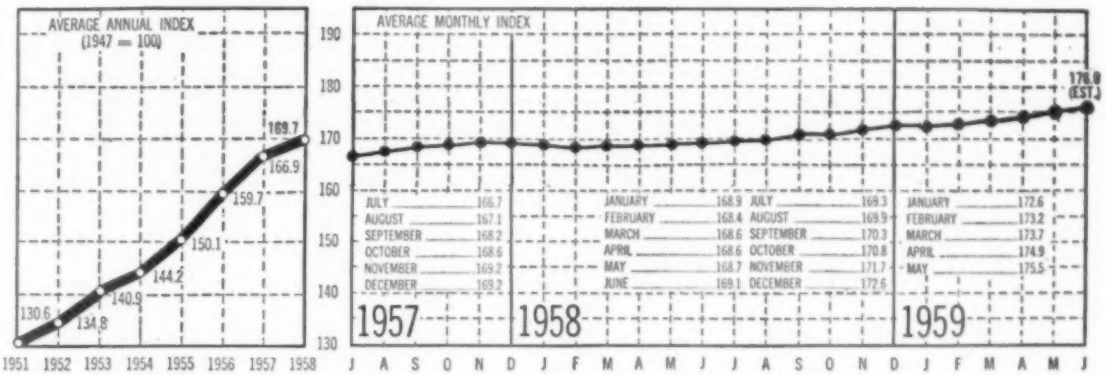
When cigarette smoke gets too thick in your conference room, wheel in your new portable (*Electro-air*) cleaner. Removes pollen, dust, dirt, too. Air handling capacity, 225 cu. ft. per min. at 90% efficiency. **(320)**

E-Z-On sun glasses (*K-R Products*) are featherweight plastic, weigh less than 4 grams. Slip them behind the lens of prescription glasses. No clips, no clamps, no bows. Green, amber, smoke. And inexpensive. **(321)**

More Ideas of the Month on pages 148 and 149

FACTORY . . . PRESS TIME REPORT • JULY 1959

Cost Index of Plant Maintenance



Cost Index Hits New High

Costs are climbing at rapid rate. By end of year the Index may reach 180.

FACTORY'S Cost Index of plant maintenance is still rising at a fairly fast pace. The over-all Index reached 175.5 in May, a gain of more than 0.3% in one month. So far this year costs have risen every month. It now looks as if the Index will move up again in June—to 176. Although recent increases in maintenance costs have been large, the gain so far this year has not reached the inflationary size of the cost increases in 1950 and 1955.

Maintenance costs in the second quarter of this year ran about 2% higher than in the first quarter. They are up about 4% over the April-June period of 1958.

Chances are good that FACTORY'S Index will hit a level of 180 by the end of the year. From here on out, costs of both materials and labor should contribute to further rises in over-all maintenance costs.

In May labor costs increased 0.4% while materials costs rose about 0.2%. Costs were cut in the case of only two materials out of the 39 for which data are collected by FACTORY's staff of statisticians. Costs of 27 items were held at the same level as in the previous month, while the remaining 10 materials registered increases in costs during the month.

Cost increases in May were centered in building materials: bricks, lumber, and millwork; and in electrical items: switches, electrical controls, and electric wire. Nonferrous metals, solder, cutting tools, and belting were the other items to record increases during the month. Look for cost increases in steel and items made of steel after July.

	AVERAGE 1958	MAY (Preliminary)	APRIL (Revised)
Building and Facilities Index	**160.8**	**166.0**	**165.5**
Materials	139.2	143.9	143.5
Brick	148.8	152.7	152.0
Elec. fixtures	128.9	127.8	127.8
Elec. switches, boards, fuses	181.5	184.1	182.4
Elec. wire, copper	122.5	139.6	139.0
Glass	152.2	152.0	152.0
Gutters, spouts, ducts	172.9	177.1	177.1
Gypsum products	139.8	140.8	140.8
Heating equipment	127.4	127.7	127.7
Lumber	124.9	136.2	134.2
Millwork	146.9	157.0	155.1
Paint	130.1	130.1	130.1
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	192.0	189.9	189.9
Pipe & tubing, copper	145.7	156.9	156.9
Roofing	120.4	134.3	134.3
Sanitary fixtures	145.0	156.0	156.0
Sash, metal frame trim	146.9	141.6	141.6
Solder	117.5	124.6	123.4
Steel, structural	231.3	236.3	236.3
Tanks, steel	138.4	137.3	137.3
Valves & fittings	160.6	161.2	161.2
Wire mesh	160.8	162.9	162.9
Labor	175.2	180.8	180.1
Carpenters	160.7	166.6	165.6
Electricians	183.5	189.7	189.2
Painters	181.3	186.2	185.6
Equipment Index	**173.6**	**179.5**	**178.9**
Materials	173.5	175.1	174.7
Abrasives	160.3	161.4	161.4
Alloys, non-ferrous	117.2	126.0	126.3
Bars & plate, steel	223.5	227.2	227.2
Bearings	163.4	164.6	164.6
Belting	150.5	156.8	155.9
Bolts, nuts & screws	229.5	225.4	225.4
Chain	184.0	184.0	184.0
Controls (electric)	181.5	184.1	182.4
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	192.9	198.3	198.3
Lubricants	122.8	123.0	123.0
Motors	147.2	148.0	148.0
Non-ferrous metals	120.9	128.2	126.5
Precision tools	153.2	157.4	157.8
Pumps	184.8	194.8	194.8
Tools, cutting	166.3	168.5	168.0
Valves & fittings	160.6	161.2	161.2
Labor	173.7	182.5	181.8
All mfg. labor	172.2	180.3	180.3
Machine tool labor	175.2	184.6	183.2
FACTORY'S COST INDEX	**169.7**	**175.5**	**174.9**

FACTORY . . . PRESS TIME REPORT • JULY 1959

Looking Ahead in Labor

Rules for labor-management relations are always changing—even when laws stay the same. This is especially true now as Congress wrestles with Taft-Hartley and labor reform legislation.

It has been 12 years since Congress made substantial changes in labor law. Little chance this year, either. But while the debate goes on, new rulings are coming from the courts and NLRB. They're as significant as laws—and often cover the same area.

Look at some recent decisions (below).

•

The U. S. Court of Appeals affirms the power of court-appointed monitors to houseclean the Teamsters union—thus dips into the fight over reform legislation—and sets a precedent for intervention.

It's what happened when 13 rank-and-file Teamsters sued to bar James R. Hoffa from becoming Teamster president. They won a consent decree limiting Hoffa to the role of provisional president while the monitors oversee housecleaning. This stands up in court—without the backing of a new law.

•

The Taft-Hartley Act is subject to a variety of interpretations—and alterations. Take the wage boost an employer grants over the head of the union he has been bargaining with. NLRB and the Supreme Court have new ideas on this:

In Case 1, NLRB says an employer may raise wages without union approval if he is convinced the union no longer represents a majority. But the law still holds that union certification can't be challenged in the first year.

This ruling hinges on the employer's ability to show lack of a majority. In this case (Stone Rubber Company) the union had become bargaining agent by a 32-27 vote. But after a 5-month strike 18 former strikers and 18 replacements were at work. The employer correctly—and luckily—assumed the union lacked a majority.

Says NLRB (in a 3-2 decision): If he had guessed wrong the raise would have been an unfair practice.

In Case 2, the Supreme Court decision goes against the unilateral wage hike because an employer committed an unfair practice during bargaining. This decision is important because the violation was committed four months after the union had made this charge before NLRB.

In this case the high court finds it was illegal for the employer (Fant Milling Company) to put the pay raise through. Why? Four months earlier an unfair labor practice had been filed against the company on the grounds of refusing to bargain.

General rules for unilateral pay raises are these: They can't be legally granted where the purpose is to weaken the union. But they're permissible in certain situations. For example, one employer granted a wage raise lower than the union wanted—but after a period of good-faith bargaining and after notifying employees and the union.

•

Here's a case to watch: It involves the right of unions to spend compulsory union dues for political purposes. It's headed for the U.S. Supreme Court, on appeal from a state court that says such a practice is a violation of free speech.

The appeal comes from the Georgia Supreme Court, where railroad employees challenged the right of their union to use their dues money for political activities. The workers' dues had been collected under a union-shop clause that the Railway Labor Act permits (though Georgia and 17 other states ban compulsory unionism.)

Says the Georgia court:

The union has no right to require membership and dues payments and then use the funds for political purposes to which the dues-paying employee objects. The court has already held (in 1946) that the Railway Labor Act's union-shop clause is legal. But it specifically noted in that earlier decision that it was making no judgment on the right to use such funds for ideological purposes.

The new case should reach the U.S. Supreme Court in its 1960 session.

SEE LABOR RELATIONS NEWS, PAGE 156

indoors and out

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FACTORY . . . OPINION

First Costs vs. Ownership Costs

In these days of enlightened understanding of plant costs, we editors have had the feeling that it's hardly necessary to belabor the point that you may end up out in left field if you consider only the first cost of the equipment you buy to improve methods or modernize facilities. Yet we've had some recent experiences that make us wonder whether we've been too optimistic.

We started with a letter from a good friend. Here's part of it: "I think you ought to be concerned about the dog-eat-dog price competition in industry today. I have seen it particularly in the material handling field. Here manufacturers are chopping prices to the point where, to get a job, the supplying company often has to take it at cost or even at a loss. The sales manager of one company recently told me he feels it is operating management that is responsible for this practice being carried to present extremes, without the knowledge of top management. Is he right?"

The day after this note came in, one of us was visited by the vice president of a metalworking plant. He got off on the question of foreign competition. The gist of his comment was this: "What in the world is happening to manufacturers in this country? I actually wonder whether they're really interested in good quality any more. By this I mean not the product alone, but also the intangibles: good service, ample replacement parts, a maker's reputation and engineering skill, and the margin of extra capacity and performance. **We see buyers in this country going for foreign tools that are 10 or 15 per cent cheaper when they can't even be sure of any of these basic requirements! What's up?"**

What's up, indeed! We ran into a chorus of complaints when we started inquiring. The makers complain that the users buy on price alone and forget quality, long life, and other important factors. The users complain about high prices and say that the makers don't really offer help in proving the superior worth of their products. Interestingly, since most companies are both makers and users, you can hear both complaints in the same plant. In fact, there's just enough bickering to lead many people to throw up their hands and pay no attention. That's bad, because the problem actually seems to be serious and deserving of attention.

The problem? In an article on building maintenance in our April issue (page 172), we put it this way: ". . . The cheapest plant to build is not always the cheapest plant to own. Savings in material and accessory costs may be wiped out by continuing high maintenance and operating costs. The owning cost of what may appear to be expensive refinements may prove over the years to be lower than the least first-cost buy. And you may never know how much lower, because the more expensive way may have averted a catastrophe."

Whose fault is it when "first-costitis" runs rampant at the expense of long-term benefits? Is it really your fault, as the letter we quoted above states?

We asked these questions of a few operating men to see what their reactions were. Our ears are almost literally still ringing from the outraged howls of protest we heard. Cleaned of profanity and comment about the ancestry of the accuser, here's a summation of what we heard: "Tell your friend he's off his rocker. The operating management man has to live with the plant every day. His greatest enemy is downtime. He *always* wants the best, but he's in a constant fight trying to justify spending an extra few dollars for the best. And the very people he's fighting are those higher management people, especially those in financial management, that he's alleged to be hoodwinking!"

The thing that's behind outbursts of this kind, of course, is rebellion against the requirement of a dollar sign to justify every phase of a purchase. Operating men argue that you can't put a dollar sign on every intangible in the quality picture, such as service, engineering help, and maker's reputations.

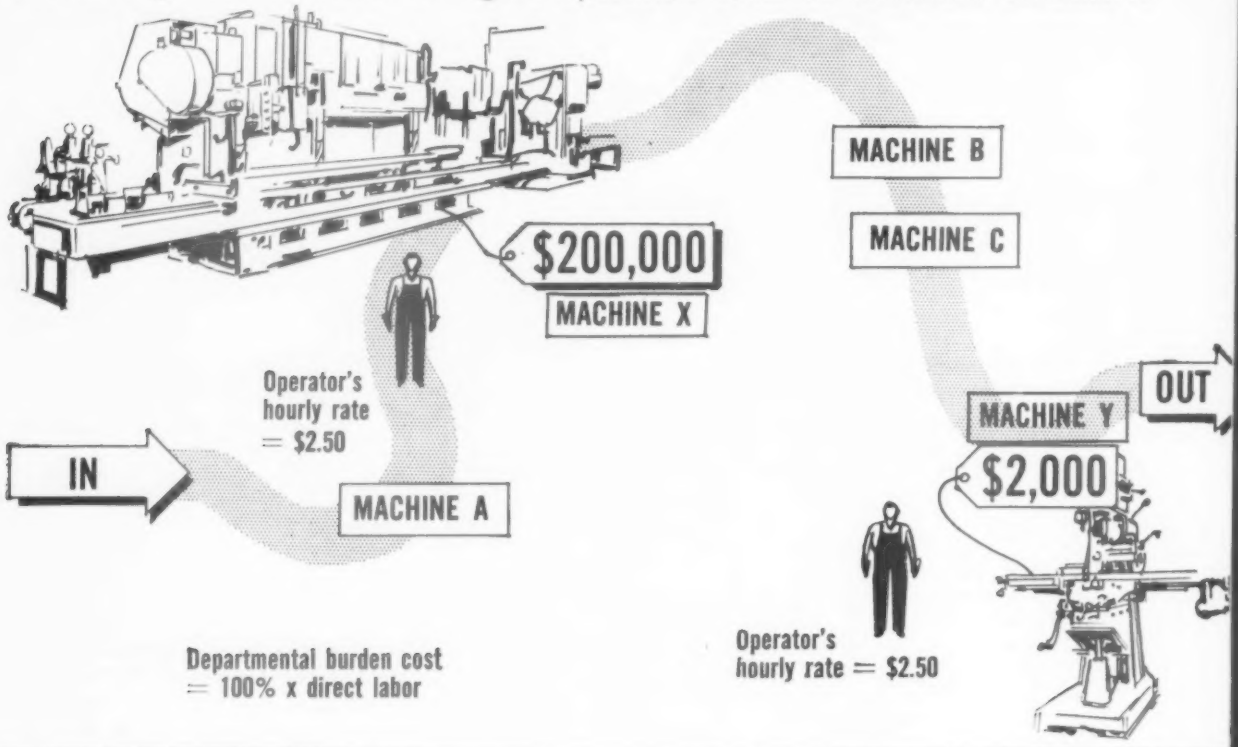
But the picture isn't all in favor of this position, either. As we have said many times in the past, operating executives *must* think like salesmen in going after new machines and equipment. This calls for careful presentation of *good* reasons for every purchase—including all the dollar figures you can get. There's no excuse for not having figures on maintenance costs, for example. Yet a survey we made almost a year ago (September 1958, page 101) shows that less than half of all plants have the necessary cost records.

Once you can produce all the dollar figures you should legitimately have available, we think you'll find a better reception for your plea to consider the intangibles as well. Maybe you still won't win all the battles, but they're worth fighting.

Don't forget: You have to live daily with those high ownership costs, not your president or comptroller!

ONE WAY TO MAKE A POOR DECISION ON MECHANIZATION:

Use average burden costs to figure operation costs of individual machines.



Better Decisions on Mechanizing

When a mechanization project doesn't pay off, what's wrong? Chances are, somebody flubbed on dollars. Here are practical tips on practical cost figuring.

FOR CUNNING in creating outlandish machines, Rube Goldberg is king. Luckily he doesn't have to fit his designs to industrial cost needs. If his designs ever do happen to need money, he'll probably equip them to print it.

In contrast, today's plant management man has to fit mechanization to costs. Sure, some of the engineering problems of mechanization are still tough. But the really tough ones now are economic. That's why today's management man needs help—and new skills.

Root of the trouble: Today's manager doesn't have accurate standards for determining costs. The solution—for current problems and the more complex problems that lie ahead—lies in his access to facts and his skill in using them. With facts in hand he can obey the four basic commands of cost evaluation:

1. Locate all the costs.
2. Identify them.
3. Measure alternative costs.
4. Compare the actual and the alternative costs.

By GERALD E. JOHNSON
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Three Steps to Better Costing

Twenty or more years ago our present costing systems might have given us a fair picture. But techniques for determining and comparing costs have not kept pace with changes in manufacturing.

A system that meets today's needs for cost evaluation will overcome this problem. The system will provide three things:

- Proper base for burden costs.
- Communication system that will

put all necessary cost elements into the hands of the people who will have to use them.

• Means of getting the right measure on individual cost elements.

1. GET THE RIGHT BASE

Years ago accounting systems dictated that burden costs be spread out on a manpower base. At that time machine investment per worker was low. If an employer had to reduce production volume, he simply reduced his manpower. Lower production didn't affect unit product cost much because the employer had little money invested in fixed capital. But today's investment per worker is much higher. In a given plant it may run to $20,000—even more. You can lay off a man if you have to. You can't lay off the machine.

The fixed-cost to variable-cost ratio has risen as plants have become more mechanized. It seems logical, then, that you should calculate burden costs, at least partially, on a capital-investment base. For example, look at the situation illustrated at left. The 100% burden rate reflects average total burden cost compared with total direct labor. Machine X and Machine Y require one operator each at a rate of $2.50 per hour. At the average burden rate of 100%, the jobs performed on both machines would cost $5 per hour (exclusive of materials).

This $5-per-hour cost we know is untrue. The investment in Machine X is 100 times the investment in Machine Y. Obviously the difference in the amounts of investment would be reflected in the true fixed costs. If, in the process of manufacturing, a product moved through all machines in the department, the total cost of the part (exclusive of material costs) when it moves out would be the total cost of the department's direct labor plus 100% burden calculated on the direct labor base. But this would not be true for correct costs on any one machine, except by coincidence.

Comparison of mechanization costs can be even more awkward. Take, for example, the case of the project engineer who worked on a problem in hardening small gears. The old method was to move the gears by tote pan and truck to the heat-treat area. After a wait they were hardened and returned by the same method. The proposed new method would take the gears automatically from the last machining operation and pass them through a continuous induction hardening process. Direct labor would remain the same. But the higher investment in equipment would cut handling labor.

Before this change was made the accounting department figured the cost of the old method was $7.6137 per direct labor hour. After the automatic set-up had been installed, accounting examined the situation and decided the cost of the new set-up also was $7.6137 per direct labor hour. It used the same departmental burden base as before.

This example points up the need for a system that allows burden to be allocated to the base on which it belongs. Costs attributed to the investment of capital (depreciation, taxes, insurance, and interest) should be fixed to a capital investment base. Costs that fluctuate with direct labor costs should be attached to a direct labor base.

2. FIND ALL THE COSTS

This can be a difficult task. Often the engineer can't get cost figures for making serious and important decisions. Maybe company policy forbids disclosure of competitive cost information. Or he may be too shy to insist on getting them. Also there may be general catchall accounts from which it's hard to extract badly needed information.

Take, for example, the case of George Jones, production engineer for the XYZ Company. George was in charge of a large integrated product line which, by his plant accounting standards, was losing money. Top management was pressing George to reduce his costs. From accounting he obtained the following breakdown of his unit product cost:

Direct labor	$ .20
Direct material	.50
Burden	.50
Total	$1.20

This is as far as the costs had been reduced. To be competitive the product had to be produced for $1 per unit. A study of direct material cost squeezed out a saving of only $.03 per unit. It became obvious that the problem of high cost lay in the burden area. A breakdown of burden costs was unavailable. George was up against a stone wall.

Then George got aggressive. He put his engineers to work to determine his complete cost breakdown —and he made some independent comparisons. He found out that his operations were being charged with the cost of grinding wheels throughout the plant. Yet his actual use of the wheels was less than 20%. Further comparisons disclosed other similar errors. George and the comptroller got together—and discovered that his integrated line was actually making a healthy profit.

The story does have its points:

• George was being held responsible for the cost of operating his line. Therefore he should have had access to unclouded cost data.

• There should have been a system for breaking down cost information and extracting it easily. And this system should have been designed to allow engineers and accountants to work together—not separately—on problems of this type.

One thing is certain, any phase of mechanization these days is strictly big league. Costs, like baseballs, have to be seen to be hit.

3. SET YOUR MEASURE

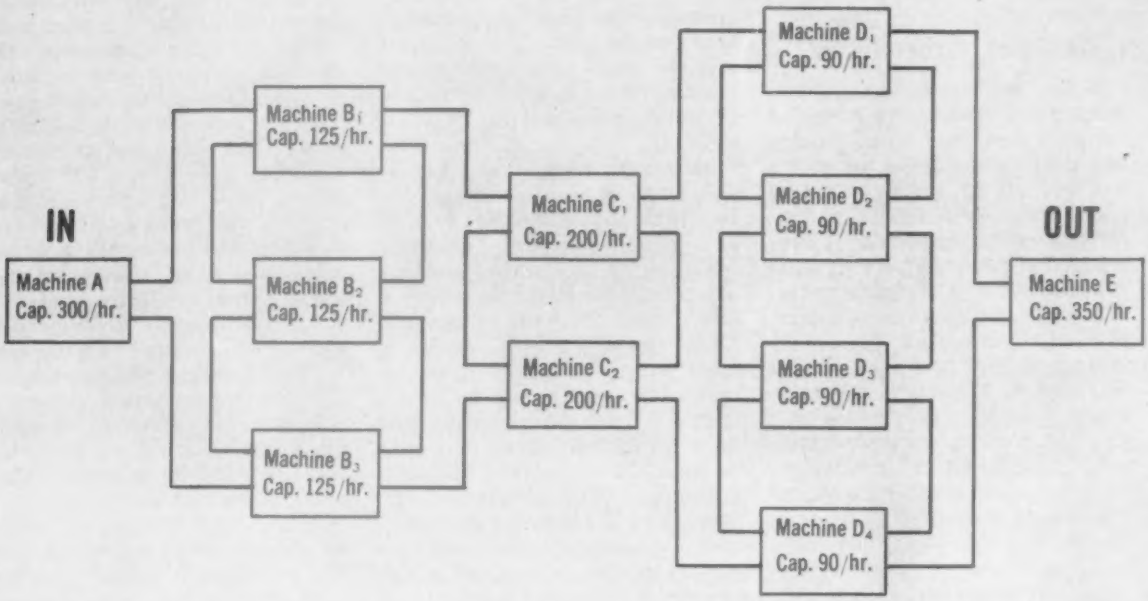
You need the right measure for individual costs. It's a major problem. You can measure so-called intangible cost elements accurately by using proper techniques. You can pin down cost of scrap and rework often by using machine or process capability studies and other quality-control approaches. And you can measure maintenance costs accurately if you have adequate records.

For example, a plant engineer was faced with high maintenance costs on an integrated line. All maintenance costs were accumulated in a single account, making it hard to separate them except by individual integrated lines.

At first it was felt that a breakdown and record of individual costs would be too expensive. But since the problem was important it was decided to keep detailed records in spite of the cost. Approximately

MONEY QUESTION: What's the cost of a breakdown in reliability?

If you invest in a highly integrated process system like this one...



...how good will machine utilization be?

	OPERATION A	OPERATION B	OPERATION C	OPERATION D	OPERATION E
Available capacity of independent machine group	300	375	400	360	350
Excess capacity per group in pieces per hour	0	75	100	60	50
Machine utilization by independent machine group	100%	80%	75%	83.3%	86%
Producing capacity considering total reliability factor	244	244	244	244	244
Machine utilization	81.4	65.2	61.1	67.9	69.8

...and what will it cost to reduce production volume?

Production requirements	200	200	200	200	200
Excess capacity, pièces/hour	100	175	200	160	150
Average machine utilization	67%	53%	50%	55.5%	57.2%
Dead machine investment	33%	47%	50%	44.5%	42.8%

50 categories (switches, valves, filters) were set up. Records were kept on a punched-card system.

At the end of several months it was discovered that nearly 93% of the maintenance costs could be pinned down within five of these specific categories. The major costs were identified and measured.

An all-out attack on these five high-cost maintenance categories resulted in a substantial reduction in maintenance costs and downtime on the line. In addition, the detailed records indicated that downtime caused by failure of certain components had a statistically predictable frequency. This paved the way for a preventive maintenance program that cut downtime still further.

How Good Costing Shapes Good Decisions

Once the proper methods for cost evaluation have been provided, you can approach some of the problems in mechanization more intelligently. But without proper methods of cost evaluation, any cost approach to the problems of mechanizing will be inconclusive. Following are four typical problems related to mechanization. In each problem better cost evaluation will steer you to the right decision.

1. SYSTEM RELIABILITY

One of the tough problems in mechanizing is downtime. Look, for instance, at the flow diagram of the hypothetical integrated production line on the facing page. To make the problem as simple as possible, let's assume that each of the machines shown, operated separately, has maximum practical capacity to produce good parts as follows:

Machine A, 300 pieces per hour
Machines B, 125 pieces per hour, each
Machines C, 200 pieces per hour, each
Machines D, 90 pieces per hour, each
Machine E, 350 pieces per hour

Now suppose the initial design calls for this integrated production line to produce at the rate of 300 pieces per hour. The flow diagram shows how you can arrange each group of machines to balance the line according to the capacities of the various machines. The middle table (facing page) shows that all operations, except Operation A, have excess machine capacity. Utilization of the other machines therefore drops. Their excess capacity cannot be adapted to any other types of production.

This excess capacity designed into the system is one of the premium costs in the automatic line. The condition is compounded by the distribution system by which each machine is joined into the system. The flow diagram shows that the five operational stages are connected by four distribution systems. Assume that each of the four systems has a reliability of 95% and that a failure of one of the systems immobilizes itself as well as the entire line. This means that if, say, the distribution system between machines C and D fails (and it will fail 5% of the time), the whole line will stop. Thus the reliability of the entire line is 95% x 95% x 95% x 95% = 81.45%. And the initial design capacity, which called for 300 pieces per hour, is now reduced to 244 pieces per hour.

The bottom table (facing page) shows what happens to machine utilization as a result. The dead machine investment becomes substantial. What's more, the line is running 18.6% short of its production goal.

Which way do you turn now? You can consider making an additional investment in your storage facilities. This may solve the problem if you can assume that the distribution system can deliver at least 300 pieces per hour, exclusive of downtime. This way, you can build up an inventory of parts between operations during downtime, allowing the machines to produce at the rate of 300 pieces per hour. Since all operations except Operation A have a capacity in excess of this figure, each operation will have capacity to absorb the inventory build-up in a short time.

For example, when Distribution System 1 is down 5% of the time, Operation A is also down 5% of the time—and is restricted to producing 285 pieces per hour. But if you provide for storage capacity in the line, Operation A can continue to produce 300 pieces per hour. Operation B will have to accept 315 pieces per hour—and it has enough capacity to do so.

One of several objectives in going to an automatic line is to reduce in-process inventory. But it is not unusual to find this objective overemphasized. Here your problem is to select the correct economic alternative. On the one hand, the line is falling short of expected capacity, resulting in excessive dead machine investment. Investment in more machinery to increase line capacity enough to assure 300 good pieces per hour off the end of the line could be one solution. On the other hand, you have the option of increasing machine utilization by spending more money in storage facilities integrated into each of your four distribution systems—and investing in additional in-process inventory. The latter solution would bring the capacity of your line back up to the 300 pieces per hour. It takes careful cost analysis to select the more economical alternative.

2. SCRAP INVENTORY

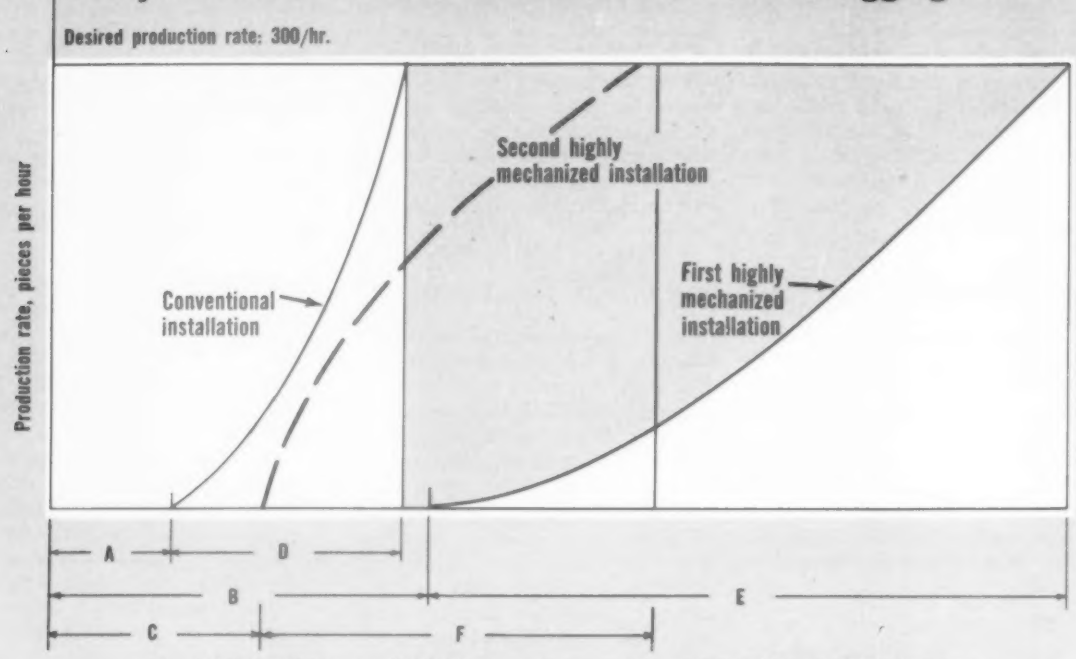
When you install a highly mechanized process, with a built-in in-process inventory, you are liable to build in a scrap inventory at the same time if you don't look out. There is a variety of feedback mechanisms to assure a bare minimum of scrap inventory between operations. Storage in the distribution systems should follow the feedback devices so that only good parts will accumulate in the system.

For example, consider an automatic gaging device installed to check the outside diameter of a bushing produced by an external grinder. Finished parts roll down a chute to the automatic gage. Good parts pass through the gage without trouble. The gage will reject a part that is outside the acceptable tolerance range and will relay this information back to the machine. The machine will reset itself automatically to compensate for the error. If a particle of grit or dirt clings to the part at the point of gaging, the part will measure oversize and the machine will erroneously be reset to make the next part smaller.

Suppose there's a chute inventory of 20 parts between the machine

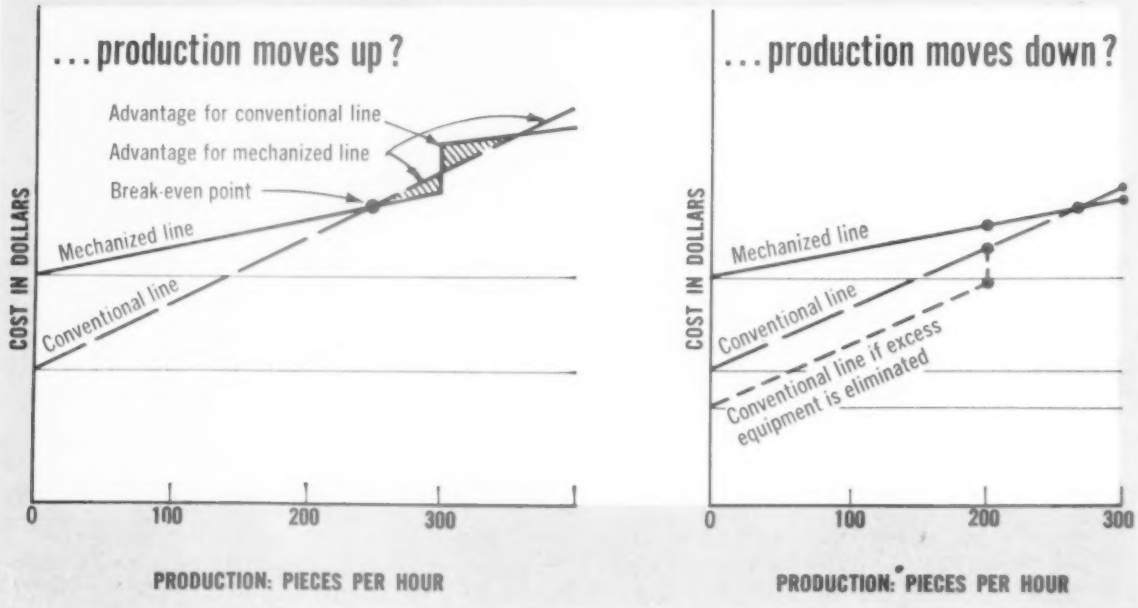
MONEY QUESTION:

Can you afford the time for installation and debugging?



A — Installation time, conventional set-up.
B — Installation time, mechanized set-up.
C — Installation time, second mechanized set-up.
D — Debugging time, conventional set-up.
E — Debugging time, mechanized set-up.
F — Debugging time, second mechanized set-up.

MONEY QUESTION: What happens to break-even when, in a highly mechanized installation...



"Planning should precede your investment."

and the gage. All these parts will be acceptable by the gage if they are within the acceptable tolerance range. But in the meantime the machine will have produced 20 undersize parts before the error is corrected through the feedback system. The economical thing to do, of course, is to avoid the scrap loss of 20 parts. Installing the gaging device ahead of the in-process inventory will do the trick.

3. START-UP COSTS

One of the big, costly problems inherent in a highly mechanized process is the time lost in getting the process installed and debugged.

Compare an integrated and highly mechanized production line with a conventional set-up. The illustration at the top of the facing page shows the relationships. The conventional set-up doesn't have the complications of special handling and other devices—and thus is likely to reach its production goal more quickly. If there happens to be trouble with one machine you can work it around the clock. And you can use banks of parts to keep other machines going at full efficiency.

But in a highly mechanized set-up you can't always get this flexibility. It's slower coming to peak efficiency. In fact, it's not unusual to find a line that has operated several years without reaching its expected level of production.

The entire shaded area in the illustration indicates the loss in comparative volume because the mechanized line requires more installation and debugging time. This chart assumes that both installations start from scratch. If the mechanized set-up is a replacement or conversion of the conventional set-up, you can minimize the loss in production through gradual change. The point is, during this time lag your investment costs will continue and your return will be considerably less than the full amount.

Now suppose you settle down with the highly mechanized line, installed and debugged. Then you decide to install a duplicate. In this second mechanized line, production probably would climb more quickly at first, level off slowly toward the peak (broken line). In other words, installation and debugging on the second line would take less time, cost less money.

Admittedly, it's hard to pin down these time lags. But it's better to estimate them—and their cost—than ignore them. Experience on automatic equipment makes it easier to estimate duration and cost. The time lag causes a lag in return on capital investment. It brings up a big economic question: "Can you reduce this costly time lag by intelligent planning?" Case histories show that you often can. But planning should precede your investment.

4. MECHANIZATION LIMITS

You can use the break-even principle to compare highly mechanized set-ups against their conventional counterparts. For example, take a look at the graphs at the bottom of the facing page.

The initial design calls for a production capacity of 300 pieces per hour, which is beyond the normal break-even point. But assume you can achieve that goal. The graph at the left shows what will happen when production is rising.

At the 300-per-hour point there is a cost transition that reveals two distinct islands of economic advantage. From the break-even point to 300 pieces per hour there is an area of advantage for the highly mechanized system. At this transition point the highly mechanized line would require expensive additions to increase its production rate. It's conceivable that a conventional set-up might be able to perform past this point at no change in investment. If these conditions were true, the conventional line might show an economic advantage. There are many alternatives. One might be to work certain machines in the conventional set-up overtime, thus build up enough inventory to maintain the higher production rate during regular shift hours.

The right-hand graph shows what will happen if you must reduce volume. A reduction from 300 to 200 pieces per hour indicates expense reductions for the conventional line as well as the highly mechanized line. But the costs do not fall at the same rate. In the highly mechanized line variable costs have been exchanged for fixed costs. Reduction in volume on the mechanized line reduces machine utilization but does not reduce investment cost. The reduction in the variable cost is small compared to the reduction in the variable cost on the conventional line. If the excess equipment on the conventional line is transferred to other uses, the cost on the conventional line will be reduced still further. You might reduce fixed costs on the conventional line even more if you reduced volume to 100 pieces per hour.

In this illustration a reliability factor of less than 100% on the highly mechanized line could easily indicate no break-even condition at all within the volume restrictions indicated.

This example leaves some question about justifying the high degree of mechanization for this line. If other conditions prevailed, mechanization might be justified. The point is, decisions can go either way, depending upon the facts. There have been far too many case histories in which companies sustained large losses because they installed automatic equipment under conditions that could not support it. This loss does not mean that the trend toward more mechanization is not a good thing. It simply means that the degree of mechanization must not exceed its ability to produce a reasonable return.

FREE FILE COPY of this article available while supply lasts. Circle FC-36 on Reader Service Card next to back cover. For complete FC list, see page 242.

Reliance Electric and Engineering Company (Cleveland) just opened its brand-new Midwest Distribution Center. It's an automatic warehouse designed to speed service with motors, variable-speed drives, and renewal parts. Star attraction: this first-of-its-kind Retriever storage system. It's a totally new approach to warehousing problems.

One man and pushbuttons . . .

Fastest Warehousing You Ever Saw

WITHIN MINUTES this new automatic warehousing system at Reliance Electric & Engineering Company gets an order on its way. It's a brand-new approach to storage and order picking. Key to the system is the Retriever (photos) that rushes motors into or out of storage. Benefits? Three big ones:

- 50% more usable storage space.
- Orders go much faster.
- Just one man (and four units) can do the whole job.

The Retriever storage system, designed by Triax Equipment Company of Cleveland, cost a bit over $100,000. Reliance figures the cost will be paid out within five years.

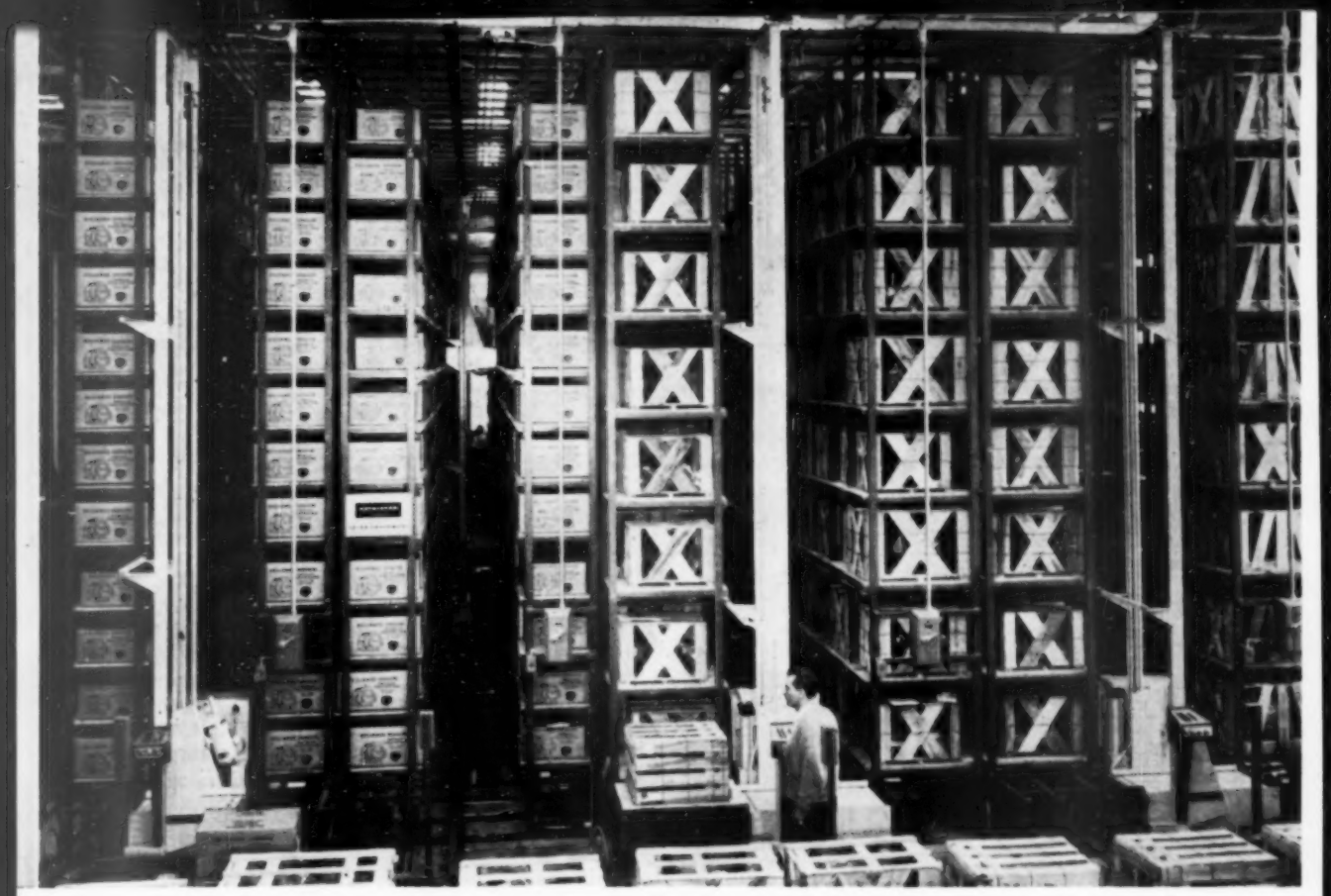
Reliance's new distribution center is a 52,000-sq.-ft. warehouse. It is headquarters for 16 distribution centers in key marketing areas. Teletype ties the centers together into one integrated warehouse. The center is divided into three parts: ¾- through 30-hp. motors, larger motors and variable-speed drives, and renewal parts. Only the first group of products—motors up to 30 hp.—is handled by the Retriever system. At present the system doesn't look practical for the other two groups of products.

The Retriever system is based on the use of an automatically programed handling machine. Set in motion by pushbuttons, it places a cartoned or crated palletized motor into an assigned storage compartment. It will also take ("retrieve") a motor from stock.

The Reliance installation stores 4800 motors in 5005 square feet of floor area. That's about half the space Reliance needed to store this many motors before. The 4800 compartments are arranged along both sides of four parallel aisles to a height of 21 feet. Each of two aisles is 150 feet long, 42 inches wide. The 2016 compartments in this area are tiered eight high, and measure 25x26 inches, 3 feet deep. Each of the other two aisles is 110 feet long, 30 inches wide. Counting both sides of these aisles there are 2784 compartments, 12 high. Each is 17½x 19½ inches and 2 feet deep. Each aisle has its own retriever cart. A loop of powered roller conveyor, perpendicular to the four parallel aisles, carries motors to and from the retriever carts.

HOW IT WORKS

Location tags, accompanying an order for motors, tell the operator where each motor is stored—aisle, side, column, or tier. To get a motor the operator presses a series of buttons on the Retriever control



can handle this entire motor warehousing area.

panel of the aisle in which the motor is stored. The Retriever does the rest. It travels down the aisle, guided by floor and ceiling tracks, to the designated column. Then turns right or left, moves up to the compartment. The cart's extractor platform moves into the compartment, under the motor's pallet. It lifts and carries the motor out into the aisle. Platform lowers and the cart returns to the head of the aisle, where it deposits the motor onto a transfer table adjacent to the conveyor. Operator attaches papers and presses another button to move the motor onto the shipping conveyor.

The Retriever stocks motors, too. Receiving and shipping are in the same dock area. Receiving individually palletized cartoned or crated motors, the unit places them on the same conveyor loop that carries motors to shipping. A one-ton jib crane handles motors between trucks and conveyor in receiving-shipping area.

The control panel pushbuttons contact counters. First button activates the motor that powers travel down the aisle. When the counter counts down to zero, the cart stops at the selected column of compartments. A limit switch starts the vertical travel motor. Its counter, activated by the second pushbutton, stops it when the platform reaches the correct height. Other limit switches act to turn the platform and operate the extractor. Platform enters a compartment high if loaded, low if empty. Automatically moves down if loaded, up if empty, after it reaches the limit of travel into a compartment. Automatic cycling controls cart's return.

Some orders require modification of standard motors. This is done in an area next to the Retriever. The operator moves these motors off the conveyor with a jib crane.

PAPERWORK KEEPS PACE

Ponderous paperwork would kill the advantages of this automatic system. The Retriever operator can fill an order within a few minutes of receiving it. That was faster than other parts of the system—until Reliance installed its new method of handling paperwork. With it orders can convert into shipping papers in as little as 43 seconds. Orders arrive at the center by mail, phone, or wire.

A mail order comes in on a special duplicating master form. A clerk assigns an order number, verifies inventory on the motor, and removes a location tag from the inventory file. She duplicates the order for a bill of lading and shipping labels. The papers and location tag are sent to the warehouse. All this can be done in just 43 seconds.

Telephone and TWX orders take a little longer because they have to be typed on the special master form. After typing they're handled the same way as mail orders.

The Retriever operator uses the location tag to program a cart. He attaches shipping papers to the motor before he sends it along the conveyor to the shipping department. The location tags go back to the office to verify shipment.

16 Clear Signs That Say

SPEND ONE HOUR a month looking for any of these 16 signs of trouble in your plant electrical system. Three big changes could follow.

- **Electrical downtime will drop way off.**
- **Maintenance efficiency and morale will climb.**
- **Accident rate will fall.**

And you don't have to be an electrical engineer to read the signs. Most electrical troubles give plenty of advance notice—if you know what to look for. Even if budgets are tight, it's vital that you know how close to the danger line your electrical system lies. Here's a review—at three levels of urgency—of the easy-to-read signs that can save you real headaches ahead if you give them prompt attention.

6 Signs That Whisper There's "Trouble Ahead"

Maintenance at Time and a Half

Your electrical maintenance staff shouldn't have to work weekends. Not if your distribution system is modern, with spares for critical components and alternate feeders. Trouble is, lots of plants buy a new system every few years in electricians' overtime wages. If your equipment is modern, it may be sensible to add spare breaker cubicles and feeders. Then you can switch loads and do preventive maintenance during production hours. A look at overtime records for your electrical staff may give you a big hint that your plant is out of date.

Less Power for More Money

How long since you—or anyone—studied your power bill? Lucky though it is that industrial kilowatt-hour rates have risen less than other plant services, you may be tempted to overlook these other penalties that you may be paying:

- Power factor penalty.
- Peak demand charges.
- Power loss from inadequate distribution equipment.

When power factor is bad, voltage levels may be low, motors may start slower, distribution equipment may be overloaded. Excessive peak demand charges may mean that closer supervision would answer your penalty-load control problem. Or study might show that the system is so poorly laid out that you can't isolate the penalty loads, or that metering is so inadequate that no one knows just when or where loads occur. Power that's lost in your distribution system through overload comes at the same cost as productive power—but it also deteriorates conductor and equipment insulation through heat, thus cuts your normal margin of safety.

So make regular load surveys to keep your power-bill extras under control. Climbing penalty charges may be the whisper of trouble.

A System Hodgepodge

Maybe your plant has everything electrical in the wrong place. Locations as well as equipment become out-of-date. A properly designed system should provide flexibility and convenience for any production process changes. Equipment such as modern load center substations, motor control centers, and plug-in bus duct can be handy yet inconspicuous—if installed properly. Some plants have modern equipment—but in the wrong place. Many more don't have it at all. In either case you're paying for wasted employee time. So check equipment locations carefully.

By G. C. QUINN, Editor
Electrical Services, FACTORY

"Power Troubles Ahead"

Power Records by Memory

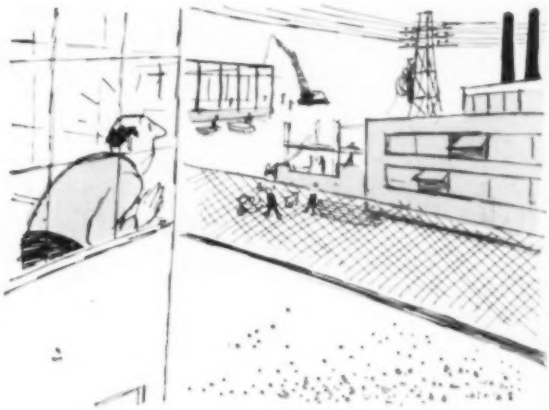
If your electrical superintendent is carrying the plant's electrical system map in his head you've proved two things: He's got a good memory, you've got a problem. He won't be with you forever. And if the system is complex, patched up, expanded over the years, or modified with time, even the best memory expert may be hazy about locations and interconnections—at critical times. Sound management demands up-to-date diagrams and plot plans.

Weaknesses of using the memory method here show up in other ways, too: Blackouts or breaks in operations because electricians or operators have to play "Guess Which Switch?" in an emergency; unnecessarily long training periods for electricians; confusing or undefined procedures; no second-line electrical supervision.

A Lifetime Behind in Voltage

Once—long ago—240 volts was enough. But most of today's loads take 480 volts. Plants clinging to 240 may not realize that voltage obsolescence creeps in slowly. Many a plant now finds itself with a load of obsolete equipment and a record of paying for two to five times the cable and bus duct it needs.

The tide turned long ago in favor of 480 volts, even though much of American industry keeps on adding to its nominal 240-volt system. A plant can ease into modern higher voltage levels a step at a time, with minimum expense and waste. But it takes planning. Are your voltage levels the result of careful economic analysis? Or did they just happen?



New Neighbors Moving In

The surge of current that rushes in when you have a fault in your primary electrical system is not determined by the capacity of your system—but by the utility's. Power companies have different policies about warning their customers when they increase system surge capability, but they all have to add capacity regularly to feed new plants (and old plants with growing loads). New neighbors are a sure sign that you'll eventually have to increase circuit breaker capacity to keep a fault from making fireworks out of your main substation. If you don't know, check with your utility now.

5 Signs That Talk Loud About "Trouble Ahead"

Careless Maintenance Habits

The quality of maintenance reflects management's attitude. Are you getting top-notch maintenance of your electrical system, motors, equipment? If not, could it be that the men are fed up with inadequacy? Do they have the needed instruments, space, safety assurances?

Here are some worker troubles that lie at the root of many expensively and poorly maintained systems:

- Requests for electrical improvements are "lost" or rejected before they get fair consideration. Be particularly on guard here because electrical obsolescence comes slowly, and it's seldom that improvement must be made in one specific year.
- Electrical recommendations are continually killed in favor of easier-to-evaluate production expenditures.
- Electrical staff gets scant encouragement to attend either off- or on-the-job training courses. And it's the last to be advised of plans to add new loads.
- No electrical representative sits in on operating management meetings.
- Electrical engineering and maintenance responsibilities are not well defined.

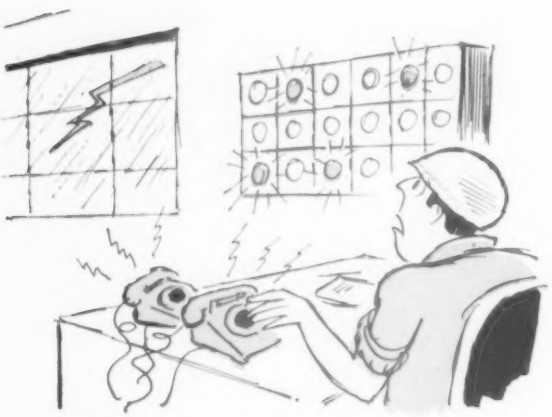
Turn the page

Begins on page 70

Every New Load a Juggling Act

A skimpy distribution system flashes a warning every time you try to add a new piece of machinery. When location changes that should be routine in a production shop call for strategic planning to find enough power, electrical economy has gone too far. A proper layout (plug-in bus duct, for example) allows production and plant engineering to spot loads anywhere without making compromises.

The trouble with operating circuits too near 100% of capacity is that you can't keep track of loads that keep sneaking in (improved lighting, auxiliary motors, small heaters, semi-portable tools, plus the constant push to increase productivity rates of your present machinery). Unless you keep close watch with instruments the skimpy system eventually will break down under the overload that nobody knew was there.



Rainy Day Madhouse

Rain or humidity shouldn't cause special troubles in an electrical system. But when age or inadequate maintenance catch up with an installation, muggy days cause a rash of flashovers, bus and cable faults, corona and leakage paths on old moisture-absorbing insulation. A modern, properly designed, and well-maintained distribution system will give as good service on wet as on dry days. If electrical downtime follows humidity, you are already paying for an out-of-date system. And the problem will grow unless you improve equipment or maintenance procedures.

Too Old for Repair Parts

If you're limping along with "Pearl Street Station" switchboards, fuses, circuit breakers, you've got built-in reminders that electrical troubles have already caught up with you—you just haven't recognized them. You also have proof that industrial electrical equipment sometimes lasts too long for its own (and your) good. Accident insurance files are filled with records of distribution equipment that performed satisfactorily for decades—until it exploded in interrupting a real fault. If your equipment is so old that repair parts have to be made on special order, replace it. It's a fire and an accident hazard. The nameplate date may be the only warning you'll get.

Chronic Low-Voltage Woes

Motors start slow, burn out, never develop full torque. Lighting levels go down as machines are started, controls wear out too quickly, electrical heating takes longer than it should, fuses blow out frequently, cable and distribution equipment give signs of being overloaded. That's a partial list of the things that go wrong when plant voltage is low.

When you can't maintain your motor voltage within 95% of nameplate ratings, performance will suffer. Lighting needs 98% voltage for top efficiency. Cure for low or spongy voltages depends on the cause. If it's overloading, adequate size conductors will provide a cure. If it's power factor trouble, capacitors will take a big load off your distribution system. If it's high-reactance conductors, wide-spaced high-reactance cables may need to be replaced by low-reactance bus duct or cable.

5 Signs That Really Shout "Trouble Ahead"

Electrical Accidents

What happens in your plant when someone is hurt through accidental contact with energized electrical equipment? Does a man have to be hospitalized before management looks on the accident as serious? If so, you haven't done the kind of top-management education job you should. The only difference between the "kick" that results in just an "ouch" and the jolt that sends an employee out of the plant on a stretcher is luck.

Do you allow any accidental electrical contacts to go unreported or uninvestigated? In follow-up investiga-

tions do you make the mistake of letting the same supervisor serve as witness, judge, jury, and prosecuting attorney? Do you file away electrical-contact accident reports without insisting that operating and maintenance procedures are changed so similar accidents cannot recur? When money just isn't available for electrical improvements, is the appropriation request lost in the pile of next year's requests? Does your electrical department feel it has to choose between safety and expansion? Does pressure for increased production ever cause your electrical staff to operate under basically unsafe conditions? If your answer is yes to any of these, you're playing with lives.

Overheated Equipment

Some plants are lucky enough to get by with electrical overloads for a long time. Sometimes for so long that they begin to mistake overload symptoms for normal operation. If any of these urgent warnings have become commonplace at your plant, real trouble is breathing down your neck: Portable fans needed to keep transformers or fuses cool. Solder lugs melted. Buswork bolts loosened from thermal expansion. Fuse-clip tension gone. Exposed copper conductors colored a purple-brown. That unmistakable smell of cooked insulation when you open a panelboard or switchbox. Bone-dry insulation on cables and buswork. Vapor fog above insulating oil in circuit breaker and motor controller tanks. Transformer temperatures too close to the red line.

Insurance Company Warnings

Hard to take though their recommendations may be, you'd better act when your insurance underwriter reports, "We strongly recommend that steps be taken immediately to . . ." Think of it this way: Insurance company engineering staffs know more about the statistics of "calculated risks" in your electrical system than anyone in your plant. They climb through the burned buildings, examine the coroner's reports, reconstruct the events leading up to the accidents. You're paying for this experience and consulting service in your insurance premium. It doesn't make sense to ignore the warning. It may be the last you'll get before your phone rings in the middle of the night.

Too Much Electrical Downtime

There's nothing subtle about a shut-down production line—unless electrical downtime has come to be accepted as a normal part of plant operation.

If a plant system is properly designed and maintained, there are only three excusable causes of electrical downtime: (1) utility power failure, (2) unpredictable electrical component failure, and (3) circuit interruptions caused by non-electrical overload.

You can partially curb even these three causes. Investment in dual utility feeders or an emergency generator may be cheaper than lost production. Newest equipment and methods (like d-c voltage absorption) will more accurately predict motor and cable insulation life. Better operator training and maintenance can reduce the third cause. Dependability doesn't just happen. It has to be paid for through the right equipment, intelligent planning, and management support.

Reluctant Electricians

Electrical maintenance men are no sissies. If they were, they wouldn't have touched the job with a 10-ft. insulator. But no electrician wants to work under hazards he can't offset by personal skill and experience. Look for these symptoms among your workers:

- Needed maintenance put off because men hate to work near breakers, open switches, obsolete equipment.
- Men quick to complain and touchy about correction.
- Excessive union grievances over safety.
- Homemade safety tools.
- Union demands for hazard-based premium pay.
- Uneasy kidding about equipment blow-ups.

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THIS IS ROBERT E. HEINE. Here Bob is in the middle of one of the most absorbing experiences of his life. He and 60 other managers are at a training laboratory.

THIS IS BOB'S T-GROUP (T for training). It has been meeting every day for eight days, as part of the National Training Laboratories' annual two-week management training experiment at posh Arden House Campus (Harrison, N. Y.) of Columbia University. The intensity you see in these faces is typical of what goes on at an Arden House Lab. It's . . .

A Brand-New Breakthrough in

TODAY Bob Heine (photos above) is back in Indianapolis. He's working at his job as director of the Production Planning, Packaging, and Methods Division at Eli Lilly & Company. Same job, sure. But a different man now. Because Bob spent two richly rewarding and exciting weeks at this year's Arden House Laboratory. Result: Today Bob faces up to his job with . . .

- More sensitivity (alertness) to needs of others.
- Deeper understanding of the kind of guy he is.
- Better perspective on his work as a manager.

Labs of the type Bob attended are the most significant breakthrough in management training since the case-study method. (That's FACTORY's opinion.) You should know about these labs, because chances are you'll be involved in one (or directly affected by one) some time in the future.

SAMPLE FROM THE LAB

What does a delegate like Bob Heine experience at the lab? Many things. But by far the most searching experience is the work done in the T-Group—a group of about 15 delegates, plus one staff man and one or two staff trainees. Here's an example of what can happen—and does happen—in a T-Group:

Fred X, usually bright and confident, sulks in his chair. This is his fourth day at the lab. He's getting nowhere. He stayed up half of last night planning a program for the group to follow, but they wouldn't consider it. Worse, the same thing has happened three days in a row. Right now, the staff man is asking the group to work on the experiences they are having:

Staff man: There are lots of rich, meaningful human experiences going on right in this room, all the time. We can learn from these.

Delegate A: You mean like Fred's problem of trying to sell us a plan?

Delegate B: I don't like to see Fred disappointed every day, but I'm just not ready for the plans he has been offering.

Delegate C: Have you noticed Fred is disappointed when his plan isn't accepted?

Delegate B: Sure, he doesn't say another word in the meeting after one of his plans is turned down.

Staff man: Everybody has favorite ways of acting. Maybe these are some of Fred's favorites.

Fred: You mean I like to make recommendations? And when they aren't accepted, I clam up?

Delegate B: All you've done is recommend, then withdraw when your recommendations aren't accepted.

Fred: Those are the *only* things I've done?

What did this little interplay (it went on for another hour) mean to Fred? Plenty. Fred discovered that his repertoire of actions was limited to just two techniques: recommending and sulking. And he was able to use this new knowledge to improve himself.

The rest of the group benefited from Fred's case, too. They learned a crucial lesson about the behavior of other people. And they had this vivid question to ask themselves: "How limited is my own repertoire of ways of acting?"

Fred's case is just one example of the lab's work. It doesn't represent a lab delegate's whole experience there any more than your liver represents you as a total person. The example smacks of "group dynamics" (the study of the ever-changing forces that determine group relationships). But that's only one part of the picture. Delegates learn about individuals, groups, and organizations.

By GEORGE A. HOY, JR., Editor
Industrial Management, FACTORY

Management Development

WHAT MAKES THE LAB DIFFERENT?

Any manager who attends the lab finds his own elements to distinguish it from the training experiences he has had in the past. So no list of differences can be made to suit everyone. But here are some parts of the experience that stand out:

• **It's intense.** Most management training schemes have trouble keeping interest high for two consecutive hours. But the lab's delegates act as interested as the bleacher crowd at the seventh game of the World's Series. And maintain their intense interest 14 to 18 hours every day for two weeks. As one example, the photo above was taken at the end of a 2½-hour session. And the group was so involved in its work the members completely forgot they were having their picture taken.

• **It demands responsibility.** In the T-Group the staff man is not a conference leader. His job is to help remove roadblocks to learning, but not to take the responsibility for learning away from the members. He encourages them to analyze the experiences they're having right then and there. Why? Because, basically, the T-Group is just like any other group the delegate works with, except there's more freedom for the human problems to come to the surface.

The staff expects the group to work. And work, in the T-Groups, is digging into the human interactions that are going on constantly. For example, giving and receiving criticism can be hard, profitable work. Criticism of the program can be work. Praising another delegate can be work. All these are examples of similar human experiences the manager faces on his job.

• **It's individual, too.** It's probably good practice to say "good morning" to employees. And it's probably good practice to take a personal interest in an employee's home life. But the staff at the lab recognizes that these trappings of good leadership are as meaningless as a glass wall in a bathroom. Behind the trappings (advocated in many a "broad brush" human relations training program) is an individual. And the trappings don't conceal the kind of guy he is.

At the lab, delegates have a chance to test out new ways of behaving, to see how a new way fits them and goes across with others. And on the basis of results, the delegate adopts some and rejects others as unsatisfactory. He does this in his T-Group. And the other people in the group feed back their reactions. They can be as frank as an artist painting a nude. But they are rarely brutal in their frankness.

The situation—climate if you like—makes direct criticism acceptable to most delegates. They find feedback their most valuable tool in learning more about others and about themselves.

• **Its goals are high.** If most management training is an attempt to have the manager take one step up a ladder, this is an attempt to have him pole-vault the wall. The risk of a fall is admittedly higher than in the step-at-a-time approach, but the rewards in insight are tremendous for the managers who get over their special walls. The feedback they get from others, for example, gives them a more accurate image of themselves than they ever had. They've gained new understanding of other people—and new skill at the difficult work of giving and receiving help.

At the same time, the lab staff repeatedly warns the delegates not to expect the training to close a neat circle around them for all time. Changes in attitude and perception are wholly within the individual. When a delegate returns to his plant, he will have to reapply these feelings and insights in a tougher, less sympathetic context.

Turn the page

Begins on page 74

Bob's experience in the T-Group was revealing enough to pull him back often to a tape of meetings (photo, left). Important as the T-Group is, it's only one part of the program. Here's a sampling of what happens in the course of . . .

A Busy, Busy

Morning, noon . . .

SEARCHING for answers is a basic part of a T-Group's day. Here (photos, right) Bob and another manager sit down and ask each other these three questions:

- What did you learn about yourself yesterday?
- What did the group learn about you?
- How will this affect what you do today?

COMPARING notes with a new friend is both a cause and an effect of the close personal relationships that grow at the lab. Bob has a chance to try out a new idea, a new way of thinking about himself as a manager.

PURSUING new ideas in the less intense atmosphere of the lunch table gives Bob a chance to slack off a little, discuss problems in a more leisurely way.

SEARCHING for progress starts each day for Bob.

. . . and on into the night

ANALYZING plant problems at the round table, Bob and his group meet each afternoon, hash over their special problems. This session helps bridge the gap between "back home" and the conference.

REFLECTING alone on what's gone before, Bob has a chance to let down completely, think through the new things he's learned about himself and about managerial problems. Solitude, he finds, helps relieve the pressure that builds up inside.

REVIEWING everything they've learned, Bob's T-Group friends meet in his room. They haggle late into the night. At the end of the two-week conference the men are weary, but wiser. Many of them start for home with circles under their eyes.

ANALYZING plant problems, each man takes his turn.

Day at the Arden House Lab

COMPARING notes doesn't stop at conference door.

PURSUING new ideas goes on right through lunch.

REFLECTING in solitude gives Bob a welcome rest.

REVIEWING the day's events goes far into night.

Turn the page

Looking at the Arden House Lab, critics ask . . .

Is It Pie in the Sky? We Say No...

IN YEARS ahead the experience a delegate has at the Arden House Lab will be commonplace. But today the woods are full of critics.

Most of the critics, unfortunately, are throwing rocks over a wall at something they have never seen. This wall is the same that confronts a competent engineer when he tries to grasp a new concept in the fine arts. And the something on the other side is not one thing—or even one concept. It's a patchwork quilt of management concepts and theories that are being applied with success today in isolated cases in industry.

The lab's quilt of theory doesn't have any edges or any definite form, because the many quilters are feverishly sewing new patches on all the time. But the center of the quilt is warm and durable, as a good quilt (or management theory) should be.

Most of the reasoned criticism is directed toward patches on the quilt rather than toward the quilt as a whole. And it's not hard to build an argument against some of the patches—if they're seen outside the context of all the others.

For example, the critics like to attack the "individual" character of the lab. They claim it's too analytical, probes too deeply—too much like group psychoanalysis.

This isn't true. The lab's work is done in the present—not in the deep, psychological past. Delegates are discouraged from rummaging around in any man's childhood for causes. The material for the lab's work comes from the present experiences of the group. It's aimed at actions, not the deep motives a man might have. And the personal part of the experience is only one part of the approach. The delegate gets help, to be sure. But he spends much more time giving help to others and learning about other individuals, groups, and organizations in the process.

Missing: solid proof—The research that has been done does not prove out the lab's program completely. But it does debunk testimonials as a means of measuring the effectiveness of the program. When asked if graduates have made important changes in their behavior, people who work with them in the plant or business find that those who say they haven't benefited often have made big changes for the better. And the reverse is also true. Some men who claimed the experience was extremely valuable failed to make noticeable changes when they got back to their home grounds.

...Because It Really Does Work

FACTORY editors know. We've seen it in action in the plant. For example:

Beltone Hearing Aid Company (Chicago) is a remarkable plant to visit. The climate is informal. Status seems not to exist in any important way. Workers act as you would expect them to act in their own homes. Yet worker effort is high. We didn't see even one person "goofing off." Vic Smith, chief industrial engineer, worries that the engineers in his department are overworking. They take plans home, even after putting in many extra hours at the plant.

Beltone has sent five men to labs over the past few years—men from general management, manufacturing, personnel, and sales. "It's had a terrific impact on our operation—and we were a pretty people-centered plant before any of us went to the lab," says General Manager Chet Barnow, an early lab graduate.

As one example of success, Barnow tells of a new wage administration and job evaluation program just installed at Beltone. Every hourly and salaried employee was affected. You'd expect the usual problems that develop when a sweeping reform of an old system is made. But this installation came off without a hitch or complaint, thanks to the climate of the plant and the use of a favorite lab device for keeping people informed. Here's the device:

After plans for the new system were firmed up, every plant employee was scheduled for a meeting with Barnow, Smith, and Verne Kallejian, the plant training director. The employees were scheduled in groups, with their supervisor as part of the group. Barnow, Smith, and Kallejian explained the purpose and workings of the new plant and its significance to the company and the employees. More important, they created a climate in which the employees could feel free to be critical. The managers laid themselves wide open to feedback. "And," says Smith, "we took our lumps—plenty." Result of the meetings: some changes in the program, complete understanding by employees, and installation without a complaint.

Here's another example of the lab's influence:

Beltone has been holding unstructured T-Group meetings for supervisors and managers every week for 18 months. The meetings are staffed by a professional psychologist who is skilled in T-Group leadership. And the climate that existed at the Arden House Lab is successfully duplicated in the plant. In the meetings, if Chet Barnow wants to discuss Project X and the rest of the group feels it has a more important topic to discuss, Chet's project gets tabled—maybe stays tabled indefinitely.

What does this do for the operation? Barnow feels it makes working together easier. The human problems that are inevitable in any complicated operation involving many people get out into the open. Once on the table, they get solved.

In addition to Beltone, Ansul Chemical Company (Marinette, Wis.), Champion Paper & Fibre Company (Hamilton, Ohio), ESSO Standard Oil Company (New York), and American Telephone & Telegraph Company (New York) have conducted successful unstructured T-Group meetings for the benefit of their managers.

THE STAFF at the Arden House Lab works constantly—often far into the night—to plan and re-plan what it does. The two staff men and the two trainees in the photo above are comparing reactions, deciding what they'll do for the next 24 hours.

But the big problem for the Arden House Lab is . . .

Finding Leaders for Future Groups

THE LAB'S CONCEPTS mirror its staff. The staff is loosely held together but carefully organized. It's constantly changing. Some members were at this year's lab, others had to miss it because of conflicting commitments or unfortunate scheduling.

Mostly, the staff members are established leaders in management, social psychology, social research, or human relations. Many are connected with universities —as professors or directors of research units. A few are consultants. And a few are employed by companies. The rallying point of the group is Lee Bradford, director of the National Training Laboratories (NTL) in Washington. NTL makes the arrangements, coordinates the program, rounds up the staff, handles details.

Bradford's background for the work is about as substantial as anybody's can be. He was part of a group headed by Kurt Lewin (the father of group dynamics, who died in 1947) that half-accidentally discovered the T-Group principle.

Lee has been the lab's director since it started in 1947. He and his colleagues in the lab are well versed in the problems of staffing an operation of this kind. As they see it, it's not possible for books or leaders' guides to make a staff man for this kind of training. And, of course, practice alone won't make a skilled leader. What's needed is a firm foundation in the principles of individual and group behavior, plus practice in the technique.

To help solve the staffing problem, every lab is also a training ground for about 10 TD's (Trainer Development men). Every TD is a graduate of the program. Each is assigned to a T-Group (two to a group is the maximum) to observe their group in every phase of the program. Each day two staff men who also work with the group meet with the two TD's to compare notes, reflect on happenings, plan their next moves (photo).

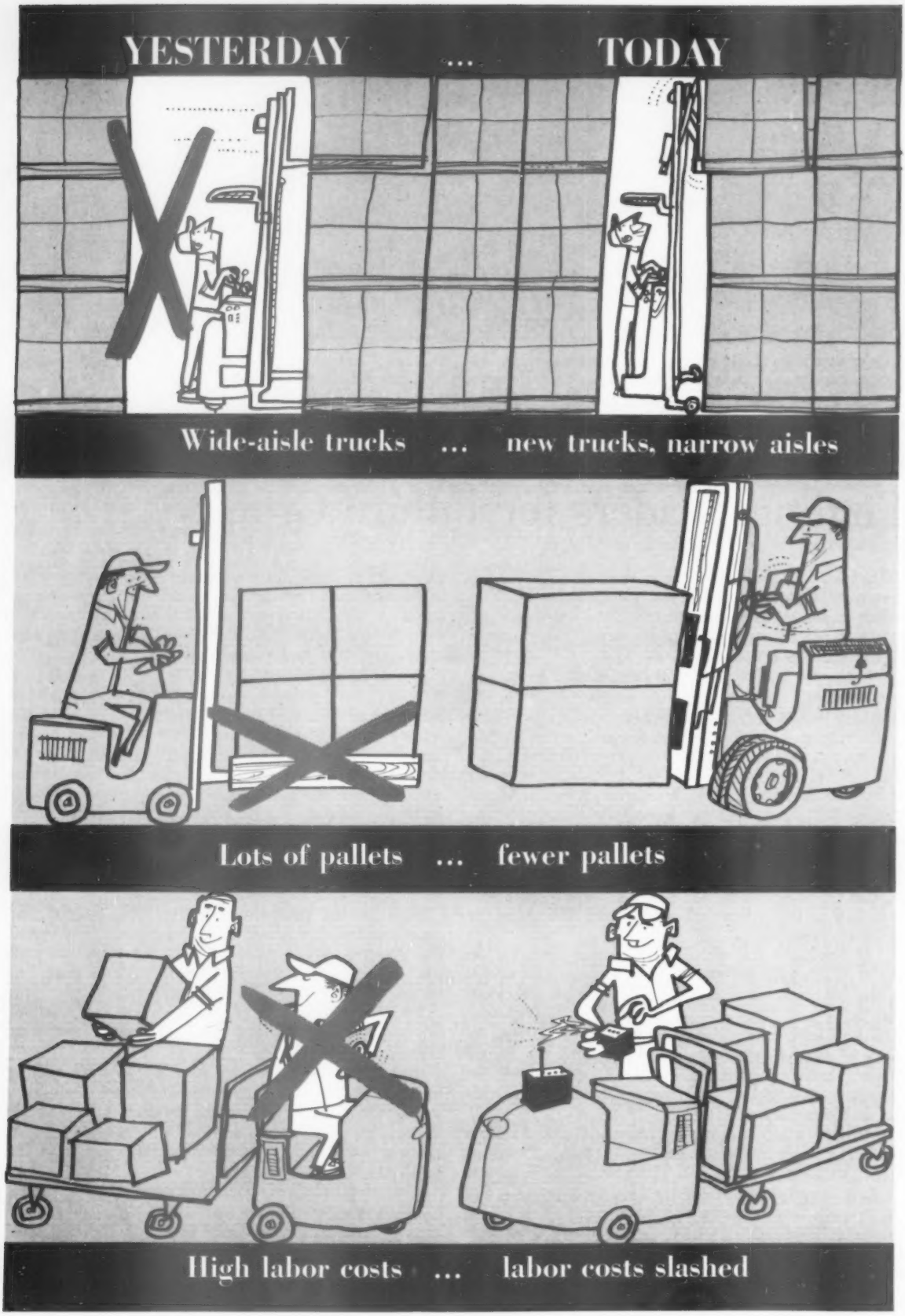
Also TD meetings are held periodically during the program. In these, the trainees get valuable experience in the staff man's role in a T-Group. It's a role-playing situation, with one trainee sent out of the room. Then the staff and other TD's in the group adopt roles that are typical in T-Group meetings.

For example, they might decide to be "in flight," a term used for a group that wants to talk about anything under the sun to avoid getting down to work. When the trainee is invited in, he doesn't know what roles he can expect the group to play. His assignment: Diagnose the group's actions and help them get back to their work of analysis. And he must do this without imposing himself on them. (In this case he should try to make the group figure out why they had been in flight.) As we heard one near-veteran TD say after such a session, "Whew—you can read about it and watch it, but you can't imagine what this job is like until you've actually done it."

Staff for the future—In FACTORY's opinion, the quality of the staff is one intangible element that makes this program orbit instead of fizzle. The men who staff the lab today are expert practitioners. But they are also prolific inventors of new theory and new concepts. This is reflected in the climate of the lab. The staff is straining just as hard to learn as the delegates, and their enthusiasm rubs off.

The staff attends lectures regularly to learn, not to make a showing. Members debate issues vigorously among themselves. And they're always ready (and have the background) to scrap any idea for a better one. This element, as intangible as a vapor trail, is part of the basic personality of the staff.

Big problem facing the lab's staff is this: What happens when the present staff is no longer adequate to meet demands for this type of training? Can a staff of men who are just practitioners—no matter how expert —produce similar results? There are lots of different opinions on this, but no sure answer.


YESTERDAY ... TODAY
Wide-aisle trucks ... new trucks, narrow aisles
Lots of pallets ... fewer pallets
High labor costs ... labor costs slashed

Today's Hottest Handling Trends

Your cost-chopping prospects never looked better, thanks to new equipment and ideas that will make it easier to manage your handling problems.

YOUR PROSPECTS for cutting material handling costs are brighter. Brighter, that is, if you take advantage of the new methods and equipment that are available to you right now—today. Last month's Material Handling Institute's Exposition of 1959 (Cleveland) showed them off. The industry introduced new cost-cutting handling equipment and demonstrated better ways to use traditional machinery.

The exposition makes three trends evident: narrower aisles, fewer pallets (or more palletless unit-load handling), and less handling labor. If you haven't done anything toward making these improvements, you're behind the times.

1. AISLES: SLIMMER

Every storage area has aisles. But you can't store anything in them—or, for safety's sake, you shouldn't. In figuring utilization of storage space, aisles are wasted. In recent years aisles have been getting narrower because the handling industry has been making equipment that will operate in smaller aisles. The exposition gave this trend a big boost. Now you have a greater selection of equipment—different kinds, too—to help you increase space utilization throughout your plant.

You can approach aisle slimming from several directions. Newer models of rider-type fork trucks are more compact, more maneuverable. Out-riggered stackers have also been improved. But the big news is being made by three types of stacking trucks: (1) "reach" type; (2) trucks that move four ways from a standing start; (3) side loaders.

The reach-type is so called because its forks extend beyond the out-rigger wheels to pick up or deposit a load. Several companies make them now. Newcomers and new models were shown at the exposition by Clark Equipment Company, Lewis-Shepard Products, Inc., The Raymond Corporation, and The Yale & Towne Manufacturing Company. They're available in 2000-, 3000-, and 4000-lb. capacities.

The second approach to narrow-aisle stacking can be made with a new type of truck that loads and unloads in one direction, moves in the same direction or at right angles. Wheels turn 90 degrees to change direction. Automatic Transportation Company's "Crab" truck comes in 2000-and 4000-lb. capacities. The Raymond Corporation's "4-D" truck operates in a 7-ft. aisle, even with long loads.

The side-loader isn't a new idea. Baker Industrial Trucks Traveloader was first. But Yale & Towne showed a new one, a 3000-lb. model that will handle pallets as well as long loads. Saves time (no turning) and space.

Other trucks shave aisle space in a different way. Forks on Towmotor Corporation's 4000-lb. "Naro-Aisle-Stacker" swivel through 90 degrees to ease handling in a 6-ft. aisle. Equipment Manufacturing Company's "Stow" unit attaches to a standard fork-lift plate, then moves pallets sideways off forks onto special racks.

2. PALLETS: FEWER

Unit-load handling is old hat. Pallets made it possible. But pallets cost money, and can be a nuisance. Now the push is on to handle unit loads without pallets. Substitution of clamp attachments of all types for forks has been the popular approach. The exposition shows a new way. Hyster Company and Yale & Towne have multi-cup vacuum devices that replace the forks of a truck. With the Yale & Towne attachment the operator "kisses" a load with the cups, picks it up when green lights tell him suction exists—a matter of seconds.

3. LABOR COST: SINKING

Any piece of handling equipment helps cut labor costs. It makes material handling labor more productive. Historically, lots of material handling equipment has worked automatically, without any operators. Now automation is chipping away at the rest—the manual and semi-automatic handling.

For example, take Barrett-Cravens Company's automated tractor-trailer operation. Now it's showing a further refinement: a "Radox" transistorized radio transmitter the size of a cigarette case. One man can start, stop, and steer as many as three tractor-trailer trains from up to 200 feet away.

Automatic Transportation has a remote-control tractor, too. It's useful for order-picking. A man can operate it from a loading position beside a trailer.

Pages 68-69 of this issue show another labor-saving method of warehousing. It's the Triax "Retriever," also introduced at the show.

TOMORROW: MORE TO COME

The most exciting news story of the Material Handling Exposition was serious talk of a new power source for industrial trucks. Called a "fuel cell," this product is based on the direct conversion of a hydrogen-oxygen mix to electricity—for powering motors.

B. I. Ulinski, director of engineering for Automatic Transportation Company, had this to say about it: "Development of the fuel cell is coming so fast I believe we'll see a general breakthrough in the whole transportation field within five years. Everybody's working on it." We understand "everybody" to mean automotive companies, major battery makers, and at least one electrical equipment manufacturer, in addition to the United States Army.

TEAMWORK At ACCO's American Chain Division, Plant Manager Earl Lathrop (center), Sales Manager William B. Ilko (left), and Industrial Engineering Manager E. L. Witte (right), study ways to improve.

MANAGED MODERNIZATION At Work

How Packaging Can

Watchful attention to your plant packaging techniques can bring you cost reduction on the one hand, a boost in sales on the other. Both pay off.

A PLANT MANAGER in Pennsylvania gets together with his division's sales manager (photo above) to work out a new package (photos, facing page). In Illinois, an industrial engineer spends three days evaluating synthetic board as a new pack for delicate castings. In New Orleans, a methods engineer comes up with a new labeling technique to stop pilferage on electronic components for export.

Each of these plant operating men is modernizing in a way not normally associated with plant operations. Yet the operating man's interest in packaging ranges wider every day—cost reduction, product protection, or merchandising. Says General Electric's Packaging Specialist W. L. Newman: "The production man will find himself involved still more in finding the package for his product that will be low in cost, sturdy in performance, attractive enough to increase sales."

At American Chain & Cable Company, Inc. (ACCO), in York, Pa., they're counting up $40,000 a year in savings doing just the sort of thing Newman foresees. The story of ACCO's development of a better packaging program is powerful evidence that the wide-ranging production man is a man who can make costs wilt.

THREE MEN KNOCK OFF $40,000

The ACCO story falls into two chapters. Chapter I opened in late 1954 when men from industrial engineering and sales got together and agreed that packages for such items as cotter pins, chains, s-hooks, chain assemblies, and repair link chains were behind the times—and unattractive as well. So the two departments set out to standardize and reduce the number of boxes (from 38 to 13). The new boxes got a redesign job

OLD PACKAGE This was just one of 34 sizes. ACCO management now uses this . . .

NEW PACKAGE Better labeling, sales appeal, and material save $40,000 a year.

Lift Your Profit Two Ways

outside, too, with a new trademark and a different color pattern. But that was only the preliminary part of the job.

Then in 1957 ACCO's second chapter began. York Plant Manager Earl Lathrop, hoping to reduce the quantity and variety of corrugated cartons in use, sat down with Sales Manager William Ilko and Industrial Engineering Manager E. L. Witte to plot further improvements. In addition to Lathrop's interest in cutting the number of cartons in use (as a cost reduction) he was interested in improving the shape and appearance of the boxes.

Plant Manager Lathrop was involving himself in merchandising; Sales Manager Ilko was involving himself in production. And the Industrial Engineering Department took charge of coordinating the project.

Spotting the troubles—The company's problem was three-fold:

- Machine chain, coil chain, and repair links were packaged in many lengths, many numbers of pieces. There was no standardization.
- Several types of chain (wound on metal spools for better display) were packed in irregular corrugated cartons for shipment.
- Other products (cotter pins, dog leads, and jack chain) were packaged in cardboard boxes, then repackaged in corrugated cartons for shipment.

The committee attacked the problem in three steps:

Step 1: Standardize cartons and select a new design for carton printing.

Step 2: Review reels being packed in corrugated cartons. Expand use of cartons as packaging material for all reels. Recommend printing design for cartons and labels.

Step 3: Replace all wire-bound wooden boxes with neater, cheaper corrugated cartons.

The team also totted up the expected savings from the switchover. There were three: Replacing the wire-bound boxes would save 50% on materials. Standardizing box sizes would reduce labor, inventory, and handling costs. Making box design consistent would boost merchandising appeal. (And increased merchan-

15 Tips From Experts

Here, from experts in packaging in a wide range of operations, come tips to help you analyze and solve your packaging problem:

1. Look for the minimum. You don't ever want more than the bare necessity, in addition to a reasonable safety margin.

2. Pack at minimum cost for safety in transit and to take advantage of changes that lead to increased product sales.

3. Use machines instead of men wherever the volume of packaging permits.

4. Work toward a package designed so that it is easy to form, pack, close.

5. Select a material that will take a label or stencil imprint with ease.

6. Make the design distinctive, bold, attractive. Brand identification is important.

7. Remember that any package has to be carefully limited in size.

8. Compute your present—and expected—output before switching to a high-volume packaging machine to do what's now done by hand. For small lots it may cost less to stick to hand packing.

9. Keep your material-handling thinking cap on when you're dealing with packaging. The functions are closely related.

10. If you export small, shiny, removable items, put a catalog number (not a description) on the crate. Don't tempt waterfront thieves.

11. Make packages bound for overseas as hard to open as possible.

12. Make export packages so they will clearly show the effects of tampering. This discourages pilferage.

13. Design your package to reduce in-transit damage to a minimum.

14. Make sure you're up on the requirements of carriers, customers, and government.

15. See if there's a way to cut inspection or repair costs at point of delivery. A small change in the package can offset a high bill.

dising appeal would make distributors happier, more likely to push ACCO products.)

The results are living up to expectations: Savings annually add up to $40,000. And the ACCO line enjoys clear brand identification on distributors' shelves. Each size or shape of the products enjoys clear identity, too.

This brief case history shows how complex it is to cut cost in packaging and how an efficient operating-sales team can solve its problems. Manufacturing, engineering, and sales—each with the other's problem in mind—set out to solve each problem. And did so. It's just this sort of cooperation that today's plant operating manager must be prepared for.

KEEPING CHANNELS CLEAR

A large part of the cooperative spirit among the various functions depends on free exchange of ideas. ACCO has clear channels of communication and the savings figures to prove it.

Another example of successful packaging cost reduction through good communications comes from the DeLaval Separator Company of Poughkeepsie. There Works Manager Ralph Williams says, "We make it a point to encourage free interchange of ideas among the functions. If you tie people up with rules and regulations they just don't do the best job." Thus it was that an assembly foreman spotted an electrical outlet on a milk transfer unit that stood upright in transit. It was taking up more space than it needed. He went to Traffic Manager Walter Pine, who called in Design Engineer Stanley Cook. The three men found they could turn the outlet to a horizontal position for shipping and save about a third on carton material. That's the way it's shipped today.

Simple, you say. Yes, but significant. Easy access of one man to another, little red tape to inhibit action. That's DeLaval's formula for successful packaging cost reduction.

An important condition for free communications is an open, flexible outlook. Today's plant operating man is finding himself faced with new requirements that affect his job. A good example is the growing importance of merchandising—traditionally a sales function—to the operating man.

At General Foods Corporation (White Plains, N.Y.) the Jello Division packaging engineer, R. L. Touart, is a former industrial engineer. "No doubt about it. Our plant men are growing more aware of merchandising requirements every day," he says.

Jerome Kipnees, vice president of Container Laboratories, Inc. (a packaging consultant firm), notes that "the plant operating man is being called on more today than ever to understand merchandising requirements, because more and more industrial producers are using consumer packaging techniques—sending out packages with multiple purposes—storage, toting, and easy opening, for example."

The most obvious aspect of merchandising is the simple labeling of a package. Says G-E's Newman: "Any product should be neatly and economically identified by company name." ACCO's Ilko says: "We have found . . . as has most of industry . . . that it is difficult to sell a product without a name on it."

G-E carries its merchandising philosophy far. Even monstrous circuit-breaker cubicles on flatcars carry a large sign identifying the maker and destination. Same is true of any similar shipment.

If the operating man finds himself meeting a wider range of packaging requirements, he's also finding how difficult it gets with each passing day to separate packaging from material-handling considerations. Both are being coordinated in progressive plants with traffic and transportation functions. The point is that packaging isn't easy to put in a vacuum. It involves too many other vital production and handling considerations to remain in isolation.

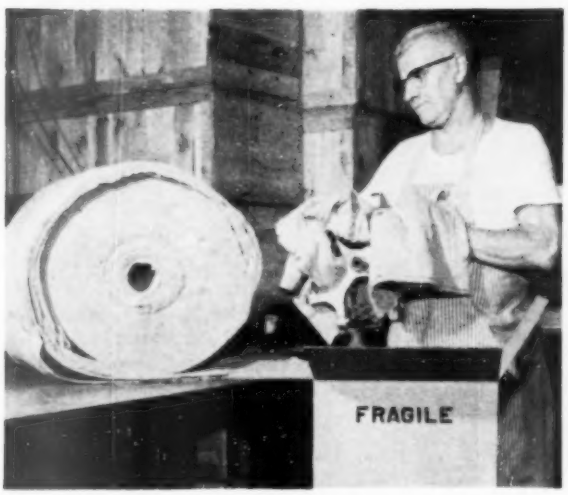
COUNTING THE GAINS

We've said a lot about merchandising so far. Perhaps you're still wondering just why we emphasize that point so much. The reason is this: There's strong evidence that the plant humming along at the best pace have operating men of broad interests, with merchandising among their interests. Fact is, a recent survey by the Better Packaging Advisory Council (New York City) of 800 companies that recently began using new packages reports that the group has had an average sales increase of 32%. And almost 600 of these companies report substantial cost reductions in container, shipping, or filling and sealing costs. The ideal new package, the companies find, cuts costs and increases sales, thus boosts profit at both ends.

This sort of survey is sign enough that it's hard to isolate production goals from the goals of merchandising when you're talking packaging. Informative tags and labels, attractive designs on packages, clear listing of contents, rugged material, shorter packing times, reduced shipping costs—all play interlocking roles in the economic welfare of your company—and any company.

Below and on the following pages you'll find some 14 case histories that illustrate cost-reduction successes in material, labor, shipping, warehousing, and handling. The one story all these examples tell is this: Through communication, training, and clinics, through advanced development, container evaluation, material measurement, and standardization, industry is steadily chipping away at packaging costs and (at the same time) increasing the utility of the packages. To find out how it's being done, read on.

14 Case Histories of Package Modernization



Output Doubled by New Wadding Material

Company: International Equipment Co., Boston.

Problem: Shipping many sizes, weights, and shapes of motors, heads, cups, and other components took care, time, expensive materials (left photo, above). Excelsior and heavy wooden crates guarded components from shock or other disturbance in transit.

Solution: Cel-Fibe cellulose wadding (right photo) plus corrugated cartons now result in a 100% increase in packaging-line output. Easy handling of the cellulose rolls cuts wrapping time in half. And the cellulose now permits twice as many finished parts to go in each container.

$348,750 Saved by Tight New Skin Pack

Company: AFC Industries, Albuquerque, N. M.

Problem: AFC, a subcontractor for AEC, was packaging a silicone rubber gasket of 20-in. diameter between ¼-in. aluminum plates recessed to fit flush. Plates were bolted together. Cost per package, $24.

Solution: AFC tested a polyethylene corrugated board skin, found it an ideal substitute for aluminum. Skin-pack cost of only 75¢ (plus easy handling, visual inspection) cut total costs $348,750.

Turn the page

What All Plant Men Should Know About Packaging

Five packaging men whom FACTORY interviewed came up with five interesting off-the-cuff comments on the subject. These comments dramatize the extreme diversity of packaging problems in industry—all the way from farm fashions to mushy cardboard.

Here's what they said:

About Consumers

"It's important to keep the ultimate consumer in mind. That may sound like an obvious statement, but it isn't. Take this example: A company always packaged its fertilizer in fabric bags. But once it tried to switch to paper bags. The sales department said 'no' because the farmers relied on the bags for their wives to make clothing. Many products are packaged in such a way that the package is useful beyond its intended lifetime, or intended purpose. It's a good point to keep in mind."

About Materials

"It takes a specialist to keep up with the field. But the plant operating man should be up on his packaging materials, at least. Know about wet-strength papers, foils, the new plastics."

About Equipment

"This is the fastest changing field there is. Speeds of packaging machines are rising rapidly. The 'supermarket' concept—high volume, quick turnover—is spreading, with a terrific impact.

About Labor

"Cost-cutting pressure comes from rising labor costs. So we make it a point to bone up on materials that can cut labor time—corrugated over wood, for example. Or molded pulp, polystyrenes, ethylenes, urethanes.

About Warehousing

"When you're packaging big items like our refrigerators you have to know what the weather's going to be. Now, 10 months a year, when the humidity and temperature are low, we can stack cartons five high in the warehouse. But come July and August, the cartons sag and the things are likely to tumble over. If sales didn't slack off in the summer, we'd have a huge bill in either warehousing or packaging. Those two months we get by stacking them three or four high. So it's only a potential problem."

Packaging Standardized

Company: Besly-Welles Corporation, South Beloit, Ill.

Problem: Packaging a wide number of industrial taps and gages required 34 different box sizes, a host of labels to identify contents.

Solution: Polystyrene-foam blocks hold the "industrial jewels" firmly in place in small plastic boxes (two sizes in four colors to distinguish different types of taps). Tools too large for boxes get a plastic cover heat-sealed on laminated stock. Labels now are pressure-sensitive, printed in the plant as needed. (Label cost reduction: $50,000.) The new packages cost 1¢ to 5¢ less than their predecessors, have far more merchandising appeal, re-use value.

Cuts Time by Two-Thirds

Company: DeLaval Separator Company, Poughkeepsie, N.Y.

Problem: Packaging pasteurizers in wooden crates took 680 minutes per pack—which added up to packaging costs way out of line. Also, material costs were considerable: Twelve pieces of trim (to brace the pasteurizer inside the package) cost from 20¢ to 70¢ each. Package base, sides, and cover added more material costs, bringing the total package cost to $54.40.

Solution: Working with suppliers, DeLaval developed a special corrugated sun-burst collar to slash packing time to 120 minutes—a reduction of 460 man-minutes in packaging time. Beside this saving in labor costs, the new pack, by eliminating almost all of the costly interior trim, cut packaging cost per unit to only $6.

18,000 Packaged Per Hour

Company: General Electric Company, Newark, N.J.
Problem: Mechanized packaging of photographic flashbulbs was too time-consuming, inefficient.
Solution: A new packaging machine that takes cellulose-acetate sheet, forms rows of cavities, slaps specially formed cardboard cones down over the bulbs, is heat-sealed. Then the machine makes perforations between cavities so customers can remove a single bulb from a 10-lamp strip. Plenty of merchandising appeal, speed enough in packaging to please G-E. The rate is five per second (18,000 per hour).

Package Handling Made Easy

Company: Reynolds Metals Company, Listerhill, Ala.
Problem: Cable-reel packaging depended on wooden lags that weighed up to 90% as much as the reel itself. Customers had a hard time disposing of packaging material, found the reels difficult to unpack.
Solution: A wrap of resilient padding, an overwrap of light plywood inside the reel flanges, and a covering of water-resistant kraft paper give equal product protection at far less weight, make for easier handling, unpacking. Entire new wrap is secured in place with metal strapping.

Cost Slashed—Damage, Too

Company: Underwood Corporation, New York City.
Problem: Despite heavy and costly packaging, Underwood's electric and standard typewriters and small adding machines were prone to in-transit damage, had to be stocked in advance of purchase.
Solution: Rubberized Hairkote pack molded to the machine (photo) holds firmly, packs faster, weighs less. Packaging costs are down by 33%. The new package makes direct shipment (within 24 hours) a reality. No branch-office stocking, inspection, reshipment.

Multiple Handling Eliminated

Company: Electrical Storage Battery Company, Philadelphia.
Problem: Multiple handling of heavy glass-celled batteries used for telephones, railroad signals, and emergency lighting damaged Exide batteries in transit. Wooden shipping crates were heavy, expensive, had to be padded, strapped with steel. It took customers up to an hour and a half to unpack a crate (plus clean-up time).
Solution: Corrugated packaging (photo) of 350-lb. test construction is five-sided, double-walled with single-face space padding. Another five-sided cover is slipped over the basic container. Damage complaints are down, unpacking takes only a few minutes, each package weighs 15 pounds less, bold imprint on pack serves as a traveling advertisement.

$2050 Off Materials, Labor

Company: DeLaval Separator Company, Poughkeepsie, New York.
Problem: Heavy centrifugal separators were shipped in all-wood containers with internal bracing. Costs were out of line: $3900 annually in material cost, $1900 in packing time.
Solution: Cleated corrugated carton with sunburst corrugated collar to act as an internal brace and a tray for the parts. One container holds both machine and separator bowl. Cost in material, $2750; labor, $1100. Reduced shipping weight saves an additional $1 on each separator bowl.

$4400 Saved in Labor Costs

Company: Markem Machine Company, Keene, N.H.
Problem: Ink tubes packed in clipboard boxes had a sawdust cushion. Each box had to be wrapped in cardboard and paper.
Solution: Tube is now set in molded styrofoam block, slipped into prefabricated cardboard container. Neater, safer. Net savings: $4400 annually.

Turn the page

Breakage Banned Here

Company: Ortho Pharmaceutical Corp., Raritan, N.J.

Problem: Safeguarding valuable blood serum in shipping was a sticky problem for Ortho Pharmaceutical. The wooden shipping container (left, above) was sturdy enough, but expensive. And the glass container holding the serum had to be packed in foam rubber. Contents, valued at several thousand dollars, made breakage a serious matter. And freight handlers regarded the contents of each wooden case as indestructible, just because the case looked it.

Solution: Working with Container Laboratories consultants, Ortho chose a corrugated container (right, above) weighing only 19 pounds (wooden crate's weight: 35 pounds). Corrugated container is only 2.5 cubic feet (wooden crate: 3). Container cost is down from $11 to $2.50, shipping charges average 12% less. Best of all, no breakages have occurred for years.

10% Cut From Weight

Company: Royal McBee Corporation, Hartford, Conn.

Problem: Corrugated paper cartons for shipment of electrical typewriters to branch offices or typewriter distributors were moderate in cost but didn't give enough protection. Typewriter was anchored by bolts inside the carton, moving parts were taped in place.

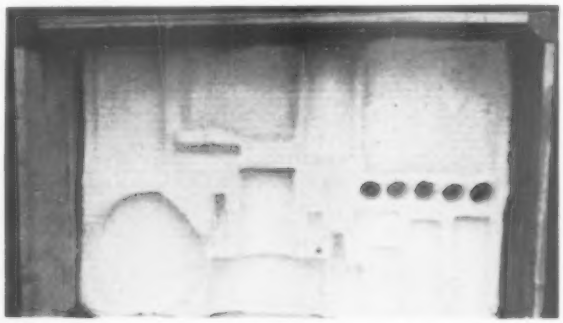
Solution: Expanded polystyrene developed by Royal McBee in cooperation with Koppers Company, Inc., and Worcester Molded Plastics Company, serves as the new packaging material. Plastic firmly holds all parts, requires less labor time, is eye-catching. Although polystyrene is more expensive than the old container material, gross weight is down by 10%. Damage claims are down, too.

The Best Package? It's the Least

Company: Owens-Corning Company, Kansas City, Mo.

Problem: Find a tight, inexpensive package for roof insulation material.

Solution: Two strips of tape along the 4-ft. dimension (photo), adhered to the mopping surface of the top and bottom boards. Makes for easy opening, easy product identification, low packaging costs.

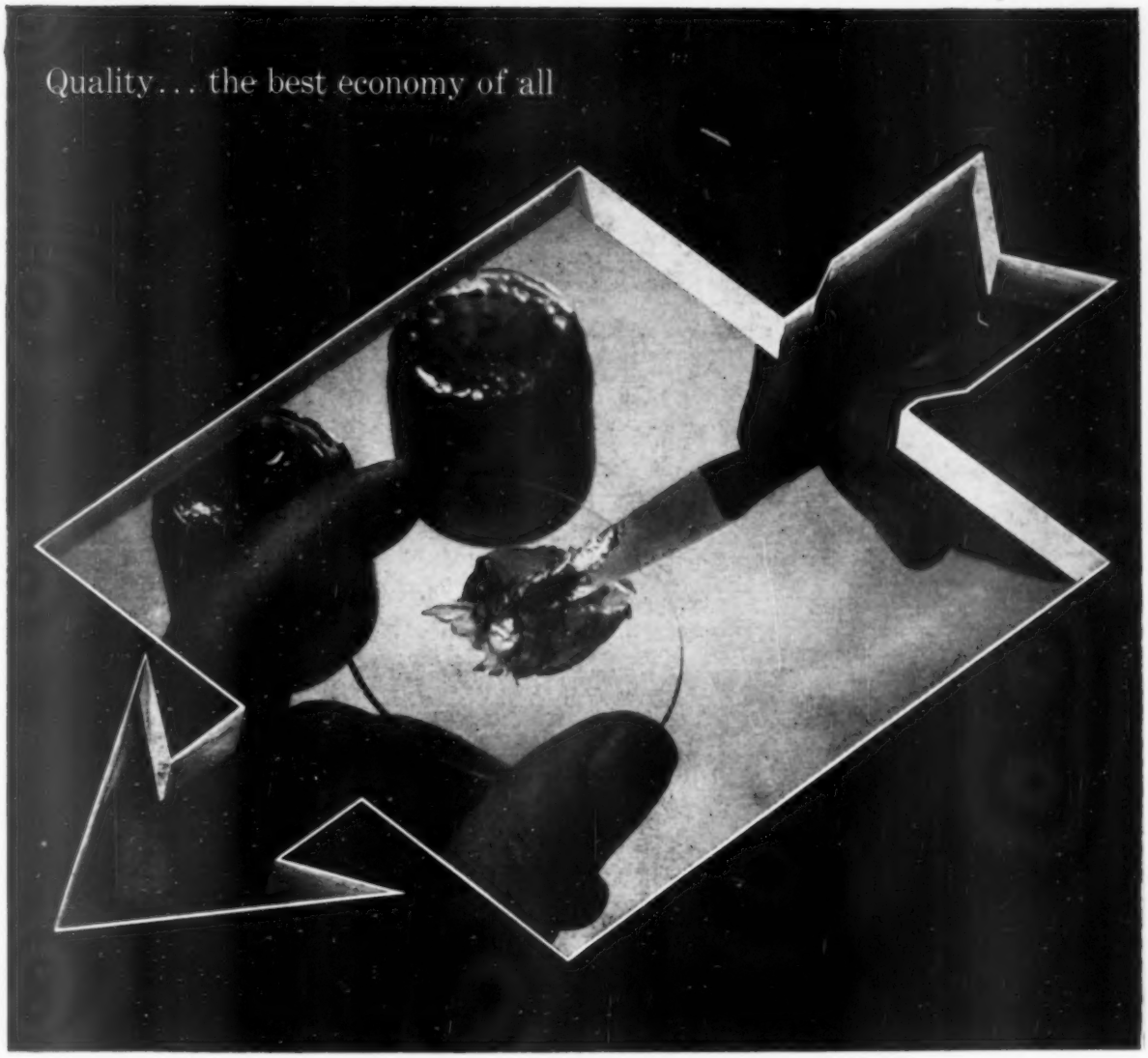


One Container—Three Jobs

User: U.S. Army.

Problem: Solid-fuel rocket engines were hard to package for full protection.

Solution: The Army (with an assist from the Dayton Rubber Company) developed this shipping container (photo) of rigid urethane foam. It serves as a parts assembly jig, a checking fixture, and the shipping container—three jobs. The container has a separate cavity for each part that's shipped. Parts are placed in each cavity as the container goes down the assembly line. Simple visual checking sees that each slot is properly filled. A wooden dummy is made to the size and shape of each needed cavity, and then mounted on a board. Mixed urethane covers the mold, making a complete, detailed replica of the mold—in negative. Low costs make this system attractive to the Army for even low-volume job lots.



It's a multipurpose grease . . . but *how* multipurpose?

You can't "feel" the answer. Any "multipurpose" grease you buy is a compromise. Lubrication engineers say it *can't possibly be* the best lubricant both for high speeds and low loads . . . and for low speeds and heavy loads. It's *got to be* somewhere in between, so that it can do both jobs fairly well.

What you should do is decide on *which* multipurpose grease is best for you. This is a decision for an expert team—you and your Sun representative—because you have to consider many variables.

We feel, justifiably, that one of Sun's Prestige Multipurpose Greases is designed with that wide range of applications you're looking for. They last longer under pressure, water, heat, and other abuses. They bear investigation. To start enjoying the real economy of quality, call that Sun man today—or write

SUN OIL COMPANY
Philadelphia 3, Pa. Dept. F-7.
In Canada: Sun Oil Company Limited, Toronto and Montreal.

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

PAY RATES FOR KEY INDIRECT JOBS—IN 6 CITIES

● All figures are average straight-time earnings in manufacturing industries except figures with asterisk, which are for *all* industries. They include incentive pay, if any, but *not* overtime, weekend, holiday, or night-shift premium.

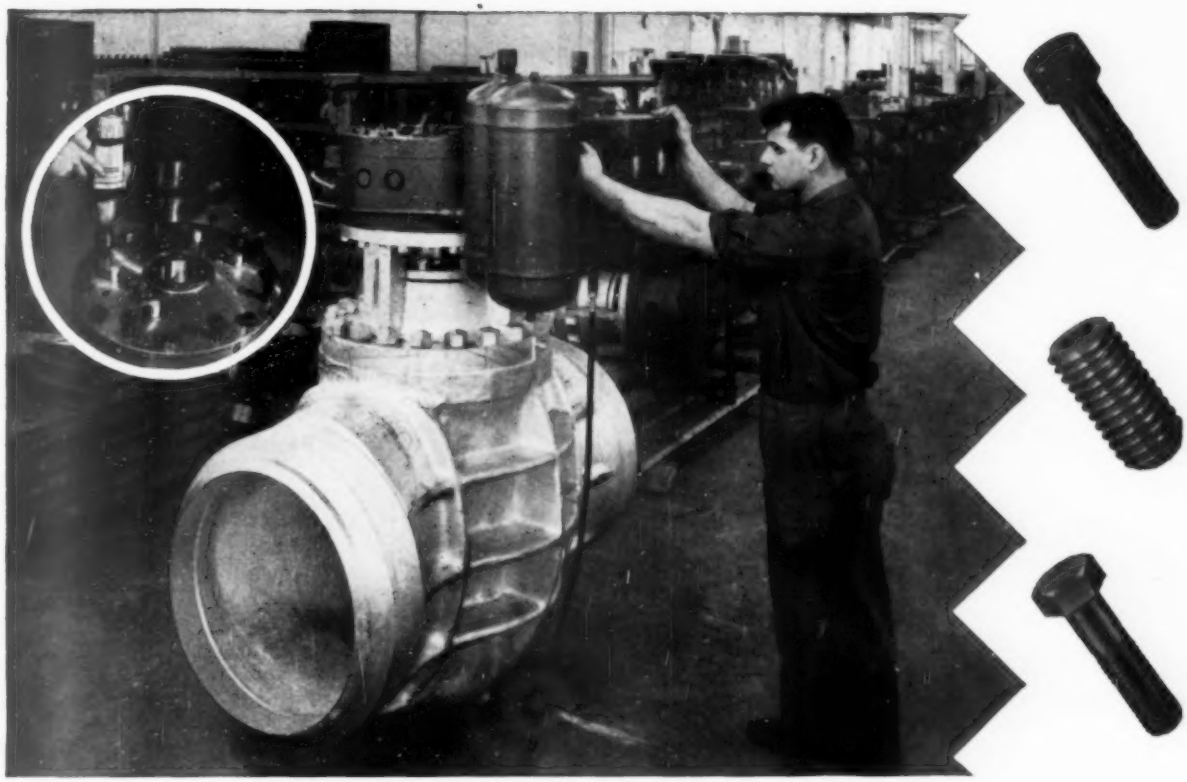
Weekly earnings are average salaries for standard work week.

	MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN	AVERAGE STRAIGHT-TIME HOURLY EARNINGS					
		DETROIT JANUARY 1959	MEMPHIS JANUARY 1959	MINNEAPOLIS ST. PAUL JANUARY 1959	NEWARK JERSEY CITY DECEMBER 1958	PHILADELPHIA NOVEMBER 1958	SAN FRANCISCO OAKLAND JANUARY 1959
Maintenance and Powerplant Jobs	Carpenters, maintenance	$2.94	$2.03	$2.71	$2.61	$2.62	$2.92
	Electricians, maintenance	3.07	2.63	2.82	2.83	2.70	3.07
	Engineers, stationary	3.08	2.40	2.63	2.98	2.45	3.02
	Firemen, stationary boiler	2.61	1.25	2.43	2.42	2.20	2.65
	Helpers, trades, maintenance	2.42	1.46	2.24	2.06	2.25	2.52
	Machinists, maintenance	3.07	2.49	2.81	2.81	2.68	3.03
	Mechanics, automotive, maintenance	2.84	1.97	2.58	2.73	2.53	2.96
	Mechanics, maintenance	3.04	2.27	2.52	2.76	2.55	2.93
	Millwrights	3.01	2.58	2.72	2.77	2.65	3.17
	Oilers	2.48	2.08	2.25	2.30	1.98	2.43
	Painters, maintenance	2.86	1.99*	2.76	2.55	2.54	2.92
	Pipefitters, maintenance	2.99	2.76	2.83	2.83	2.72	2.97
	Sheetmetal workers, maintenance	2.97	–	–	2.75	2.65	2.91
	Tool and die makers	3.17	2.83	2.95	2.84	2.87	3.38
Custodial and Material Movement Jobs	Guards	2.48	2.01	2.14	2.15	2.06	2.31
	Janitors, porters, and cleaners	2.19	1.42	1.88	1.91	1.79	2.20
	Janitors, porters, and cleaners (women)	1.95	1.23	1.65	1.70	1.51	2.04
	Laborers, material handling	2.30	1.41	2.07	2.27	1.94	2.30
	Order fillers	2.37	1.62	2.05	2.05	1.92	2.42
	Packers, shipping	2.28	1.67	2.03	1.92	1.80	2.28
	Packers, shipping (women)	2.22	1.25	1.56*	1.62	1.50*	–
	Shipping clerks	2.49	1.84	2.28	2.18	2.14	2.42
	Shipping and receiving clerks	2.43	1.68	2.29	2.22	1.99	2.53
	Truck drivers:	2.45	1.17*	2.54	2.23	2.07*	2.69
	light (under 1½ tons)	2.45	1.17*	2.54	2.23	2.07*	2.69
	medium (1½ to and including 4 tons)	2.59	1.61	2.37	3.15	2.45	2.75
	Truckers, power (forklift)	2.36	1.66	2.18	2.26	2.07	2.42
	Truckers, power (other than forklift)	2.47*	2.04	2.23	2.02	2.00	–
	Watchmen	2.05	1.20	1.79	1.73	1.74	2.10
	FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN	AVERAGE STRAIGHT-TIME WEEKLY EARNINGS					
Office, Professional, and Technical Jobs	Comptometer operators	84.50	65.50	71.50	73.00	67.50	79.50
	Draftsmen, senior (men)	135.50	111.00	106.00	113.50	108.50	114.00
	Draftsmen, junior (men)	97.50	74.00	85.00	86.50	83.50	90.50
	Duplicating-machine operators	77.50	56.00*	55.00*	65.50*	60.50	71.00
	Key-punch operators	84.50	66.50	60.00	72.00	65.00	75.00
	Nurses, industrial (registered)	99.00	80.00	85.50	88.50	85.00	95.00
	Office girls	70.50	47.50	46.00	55.50	49.50	64.50
	Payroll clerks	88.00	64.00	67.50	76.00	70.50	85.00
	Secretaries	101.50	71.00	78.00	87.00	85.50	93.00
	Stenographers, general	89.50	64.50	64.50	73.50	67.50	82.50
	Typists, class A	87.00	63.00	60.00	68.00	69.50	82.50
	Typists, class B	73.00	51.00	55.00	61.50	57.50	68.50

Indirect Wages Up in Six Cities

In June FACTORY reported (page 101) latest indirect wage costs —all rising—in seven cities, direct from the Bureau of Labor Statistics, U. S. Department of Labor. Now here's the latest data for six other cities. And the story's the same: Indirect wage costs are still soaring.

To check the wage trends in your own area, see previous BLS studies reported exclusively in FACTORY for June 1959, June and September 1958, May and August 1957, May and August 1956, May and September 1955. And watch for another exclusive BLS report on indirect wages in another selected group of cities—coming soon in FACTORY.



Stanscrew service adds strength, lowers costs for Shafer Valve Company

The valve operators produced by Shafer Valve Company of Mansfield, Ohio are used to open and close large valves on gas pipe lines . . . often in remote locations, many miles from human supervision. They are subject to sudden surge loads which cause extremely high stresses . . . and their critical importance demands unfailing reliability of all components.

Shafer formerly manufactured their own fasteners for this demanding application from a special high strength steel. Then their distributor arranged for a visit from Stanscrew's fastener specialist. He quickly established that Stanscrew's heat-treated "Carbon Restoration" cap screws, correctly applied, could provide even greater fastener strength . . . and at a significant saving in cost.

The Stanscrew fastener specialist may be able to make similar savings or improvements in your assembly operations. For he brings to your application the experience and facilities which have made Stanscrew a leading supplier of fasteners to the top names in American industry for over 80 years. And he can select money-saving answers to your problems from a complete line of over 5,000 different types and sizes of standard fasteners . . . always in stock, quickly available.

Whatever your fastener requirements, call your nearby Stanscrew distributor today. He will arrange for a prompt visit from the Stanscrew fastener specialist.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

FACTORY EQUIPMENT NEWS

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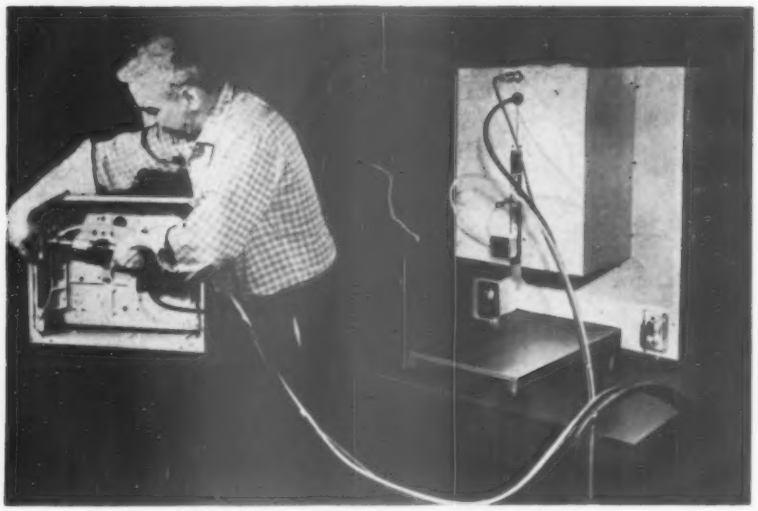


YOU CAN DRIVE SCREWS 15 FT. AWAY WITH THIS . . .

Portable Screwdriver-Feeder

Automatic feeding and driving of socket set screws is now possible with this table-top portable machine. It can be moved easily from one work area to another in your plant. And the gun-type driver can be either machine-mounted or hand-held for setting screws 15 ft. away. Two flexible hoses lead from machine to driver for remote operation.

Here's how gun works: A screw is fed to selector from rotating hopper. It's correctly positioned, then carried by air pressure (up to 60 psi.) through one hose to gun. Other hose supplies 110- or 220-v., 60-cycle, 3-phase current. Clutch mechanism prevents driver from tightening screw beyond pre-set torque or depth. When machine-mounted, gun is operated by pedal to permit operator use of both hands. Drives up to 2000 screws per hour. In three models for screws in diameters Nos. 4 to 8, 10 to $\frac{3}{16}$ in., $\frac{3}{8}$ to $\frac{1}{2}$ in. *Bristol Co.* (Circle 101).

102—Motor Scooter, with speeds up to 30 mph., is recommended for interdepartmental transportation. Midget-size carries up to 300 lb. and gives up to 100 mpg. It's powered by a 2½-hp. engine and operated by hand throttle and foot brake. *Louisville Machinery & Welding Co.*

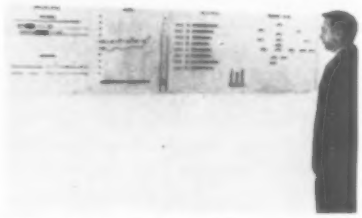
103—"Helicraft" Welder, low-cost tungsten inert-gas welding outfit for small shop use, works on d-c power source in ranges up to 100 amp. Features high speed, reduced distortion, excellent penetration. No post-weld cleaning, grinding. Price: under $100. *Air Reduction Co.*

104—Mobile Ultrasonic Cleaner rolls around on rubber-tired wheels to service meters, tools, insulators, etc. Cleans most items in less than minute. Comes in tanks up to 75-gal. capacity, generator up to 2500 watts; 115 v. or 220 v. a-c outlet. *Acoustica Associates, Inc.*

105—Pallet Dollies, for straight-line push (non-tilt) or 360-deg. movement (tilt), speed handling of palletized loads. Keep goods on move in areas where fork trucks cannot operate. Seven sizes with 4 to 10 rollers. Capacity, 2000 to 5000 lb. *Nutting Truck & Caster Co.*

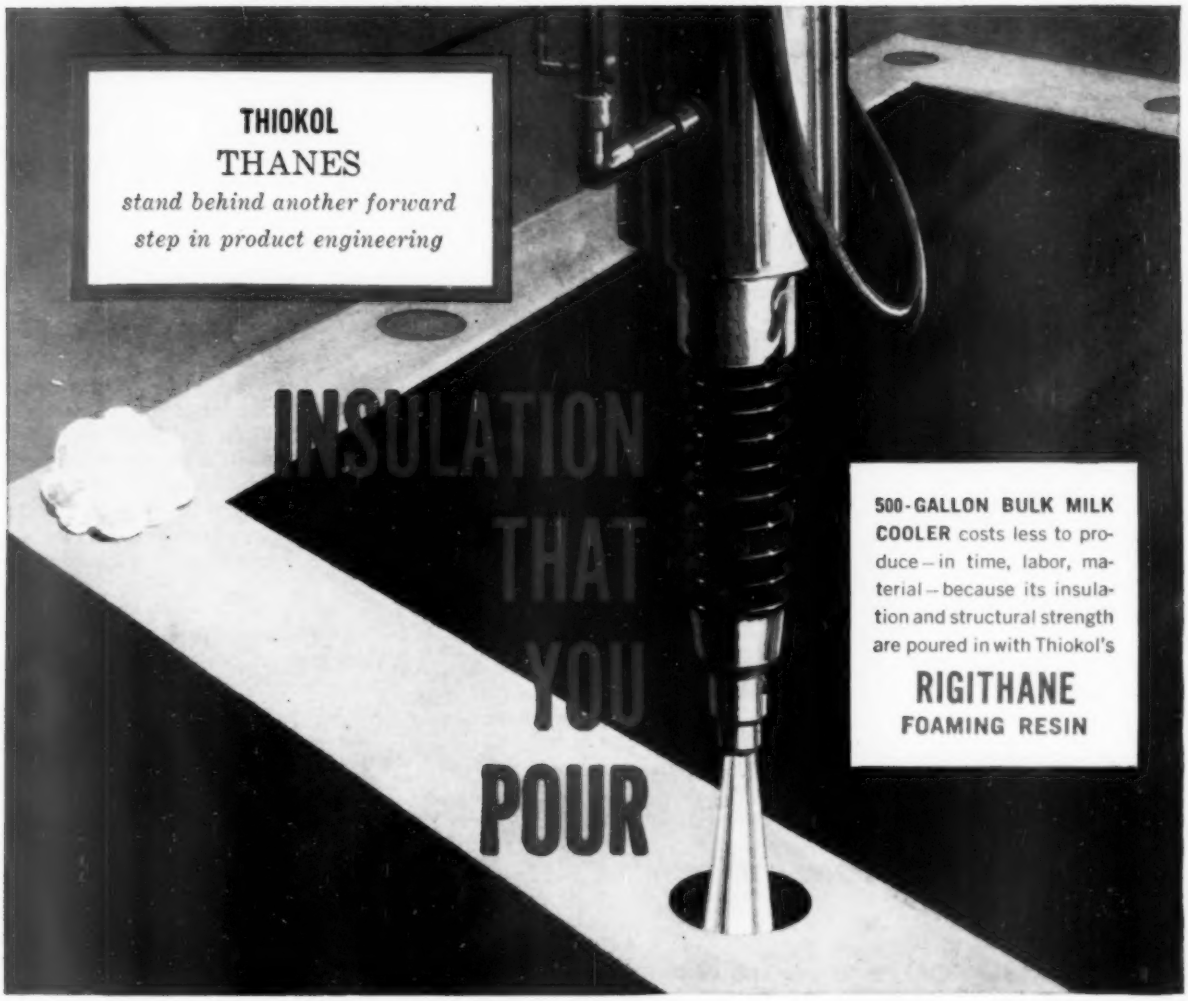
106—Air Powered Router weighs 3 lb., makes partial or complete cut through metals, plastics, wood, or honeycomb materials. Vibration-proof, it has positive-locking depth adjustment to insure cutting accuracy. Downward air exhaust for chip removal. *Buckeye Tool Corp.*

107—Automatic Carton Selector recognizes seven printed codes. Packages on assembly line or conveyor are sorted, counted, and recorded for inventory. Comes with counter and memory device to control conveyor or switches with an output signal. *Atronic Products.*



108—Control Board uses colorful signals and inserts that press on for limitless graphing possibilities. Gives immediate visual picture of machine loading and order control, sales and personnel control, control of craftsmen and maintenance projects. *Visual Controls Co.*

Turn the page



Adds structural strength, cuts manufacturing costs

Makers of bulk milk coolers cut time required to insulate their units from several hours to under fifteen minutes—and step up production—by using Rigithane foaming resin. They also reduce the thickness of steel and copper panels from which coolers are made because Thiokol Rigithane adheres to metal walls and provides structural strength.

Poured into wall cavities, Rigithane foaming resin delivers a layer of low density foam with low thermal conductivity and is strong enough to withstand the pressure of 500 gallons of fresh milk. Less working area is needed for production as well as less storage area for insulation inventory.

Rigithane foaming resin produces foams with a wide range of densities. They're foamed in place with manual or automatic equipment. Properties include low k factor, dimensional stability and flexural strength. Adaptable to your product? Perhaps. Use coupon to get full information.

Thiokol®
CHEMICAL CORPORATION
780 NORTH CLINTON AVENUE • TRENTON 7, NEW JERSEY
Canada: Rangeley Chemicals Division, Dominion Rubber Co., Elmira, Ontario
®Registered Trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, synthetic rubber and other chemicals for industry.

FOR MORE INFORMATION about Thiokol Rigithane foaming resin send coupon to Thiokol Chemical Corp., Dept. No. 43, 780 N. Clinton Ave., Trenton 7, N. J.

Name _____

Firm _____

Address _____

City _____ State _____

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For more about these items, circle numbers on Reader Service Card next to back cover.

Mobile "Cranes" for Tight Spaces

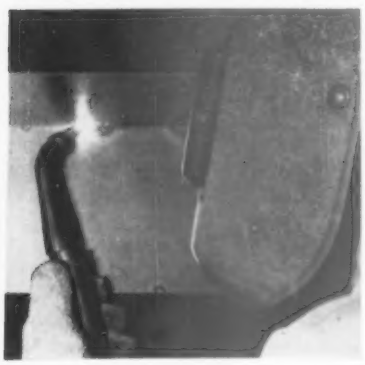
These mobile "cranes" can squeeze into hard-to-reach areas to simplify your heavy material-handling problems. Tripod (left) and gantry (right) move to any spot in the shop or field to lift weights up to 9000 and 8000 lb., respectively.

Lightweight tripod folds into a compact, easy-to-carry unit which fits into station wagon. Smaller size fits in average car trunk. A practical "Skyhook" for "no-crane" areas, it can be set up and put in use more quickly than bulkier heavier, more expensive equipment.

Height is adjustable from 4 ft. to 6 ft. 9 in. for smallest unit and from 10 ft. to 17 ft. 3 in. for largest Legs adjust independently for setting on uneven levels. Removable "spikes" at tips hold firm on most surfaces. Machined alloy head has free swiveling eyebolt that always hangs plumb, avoiding twist on head.

"Universal" gantry differs from conventional unit in three ways. Its height and caster spread are adjustable, and it has a self-leveling I-beam. Smallest of the gantries collapses to 5 ft. 11 in., permitting movement under firedoors and other low areas without dismantling. Largest-size gantry extends to height of 17 ft. 2 in. All legs adjust to height individually for positioning in pits or very tight spots. Caster spread is adjustable from 4 ft. to 6 ft., and up to 10 ft. without tie rods. Trolley travels entire I-beam length freely. Legs fold against I-beam simply by pulling self-locking, chain-held pins. Hoist is not included with gantry, but can be ordered. *B. F. Wallace Products Co.* (Circle 109).

Welds Thin Metals With Precise Control



"Short-Arc" welding pinpoints control of arc heat to join thin materials in any position with minimum distortion. With this new process, manual or mechanized high-speed fusion welds can be made economically in thickness range of 0.030 to 0.100 in. on all common metals such as carbon steel, stainless steel, aluminum (0.040 in. minimum), copper, etc. Process uses constant potential power supply, inert-gas shielding and feed wire as small as 0.020 in. *Linde Co.* (Circle 110).

111—Fluorescent Lamp lights all the way to electrical contact pins. Translucent bases at end of lamp make possible end-to-end light concept. Brightest 40-watt tube ever developed, it produces 3200 lumens in contrast with 2650 for tubes now in use. *Westinghouse Electric Corp.*

112—Vacuum Tube Voltmeter serves as ohmmeter and ammeter. Has 13 voltage ranges from 100 microvolts to 1000 v.; current ranges from 0.1 microamp. to 1 amp.; resistance from 0.02 ohms to 5000 megohms (measures wire sections as short as 6 in.). *Hewlett-Packard Co.*

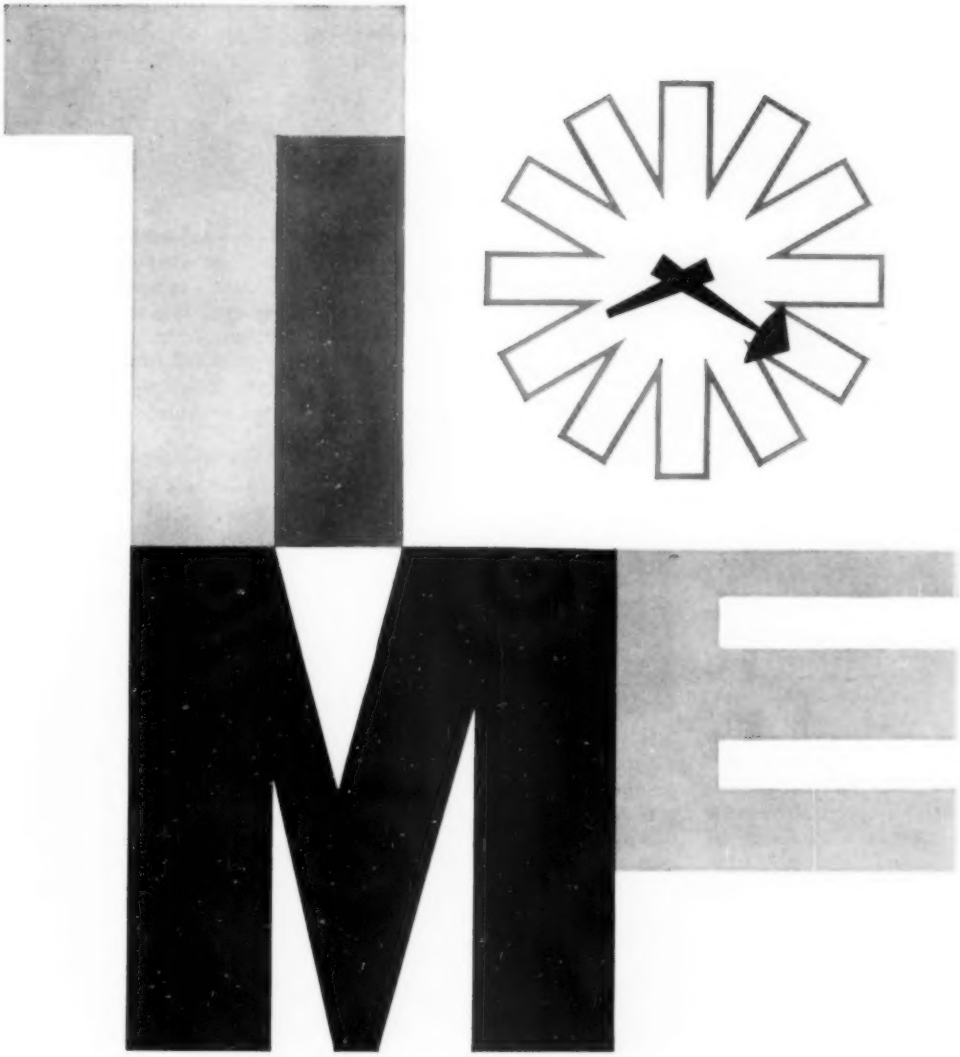
113—Coolant Filter removes ferrous, non-ferrous, and non-metallic solids centrifugally. "TurboMatic" extracts solids and deposits them in high-capacity bowl. Bringing bowl to standstill, allows sludge to fall out. Capacity, 33 gpm.; speed, 1450 rpm. *De Laval Separator Co.*

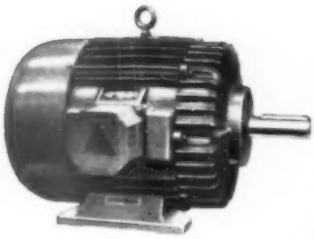
114—"Air Lift" Control for granite angle block allows operator to guide it into position with merely a touch of finger. Block floats on air cushion while being moved. Air is piped into hole in back of block and led to series of grooves on bottom surface. *Herman Stone Co.*

115—Airless Tires of nylon and rubber, for material-handling equipment, assure easier riding and steering, more even wear, more traction. No downtime, no flats—even over jagged stones, brick, metal, or glass. Long-lasting under extreme driving conditions. *Notat Tire Co.*

Turn the page

Delco delivery





Delco Delivery Time

How does this fit in with your production schedule! Delco Products offers from in-stock to three weeks delivery on integral h.p. polyphase motors. This includes rerated 182 through 445U frame sizes. In many cases overnight delivery is available! A modern assembly system, geared to your needs, makes this type of quick delivery possible. Now you can be sure of faster delivery, plus the quality and performance for which Delco Motors are famous. Always call Delco Products for the best possible motor in the least possible time.

DELCO MOTORS

Delco Products, Division of General Motors, Dayton, Ohio
Branch Offices in Principal Cities

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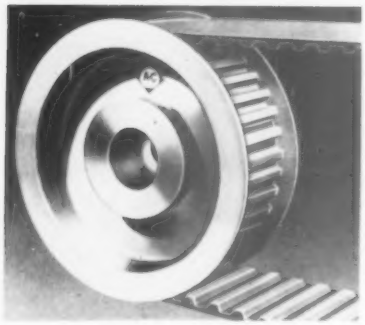


116—Timing Belt Drive is for subfractional to 600-hp. applications with torque loads from thousands of ft.-lb. to in.-oz. "Time-Tex" has speeds to 16,000 fpm., 5 pitches from ⅛ to 1¼ in. Little friction, thus no heat build-up; high efficiency. *Allis-Chalmers Mfg. Co.*

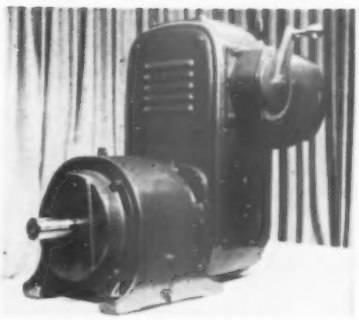
117—Strip Chart Recorder handles voltage (0 to 150 or 0 to 300 a-c, up to 500 d-c) and currents (1 ma. to 5 amp.). Portable unit is size of a "Brownie" camera, uses 63-ft. roll of pressure-sensitive paper. Speeds to 30 in. per hr. Prices to $84. *Rust Industrial Co.*

118—Wire Rope Trolley Hoists, for heavy duty, have capacities from 1 to 25 tons. Available in single-, two-, or variable-speed drives for trolleys and motors. Powered by 115/230 v. d-c and 220/440/550 v. a-c motor. Lift speeds from 10 to 100 fpm. *Harnischfeger Corp.*

119—"True Mass" Flowmeter measures liquid and gas flow in pounds to within ±1% accuracy. Self-contained, it operates from unregulated power supply without effect on accuracy. Adapts easily to automation. Meters most fluids including hydrocarbons. *General Electric Co.*

120—Automatic Inserting Machine feeds up to 3000 pieces per hr. to such parts as terminals, connectors, pins, studs, and other types of fasteners. Two hoppers feed parts through chutes for positioning, cam-operated ram presses them lightly into place. *Hill Machine Co.*

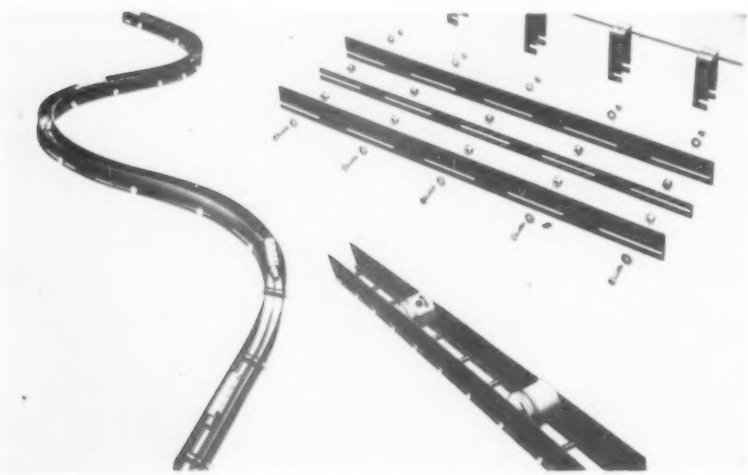
121—Ultrasonic Flaw Detector and depth gage picks up defects ⅛ in. or more beneath surface. One man can easily carry it. Useful for field testing. Operates on 110-v., 60 cycles, drawing 160 watts. Frequencies from 0.4 to 10 mc. Low cost. *Branson Instruments, Inc.*



122—Adjustable Speed Drive operates on principle of V-belt connected, adjustable variable pitch pulleys. Has stepless control mechanism. In ¼ to 25 hp., speeds from 5 to 4000 rpm., with speed variations of 2, 3, 4, 5 to 1. Features easy maintenance. *General Electric Co.*

123—Plate Magnets, waterproof and with high resistance to demagnetization, remove dangerous iron junk from materials in process. If junk is not trapped at first magnetic area, it is stopped on wide second pole piece. For chutes, ducts, etc. *Indiana Steel Products Co.*

124—Plastic Container, holding 1 gal. of wide variety of liquids, is square-shaped. It takes up 37% less space and is 2½ lb. lighter than glass jug of equal volume. Reduces transportation and warehouse costs. Shatterproof, resists corrosion and permeation. *Plax Corp.*



Obsolete? Never

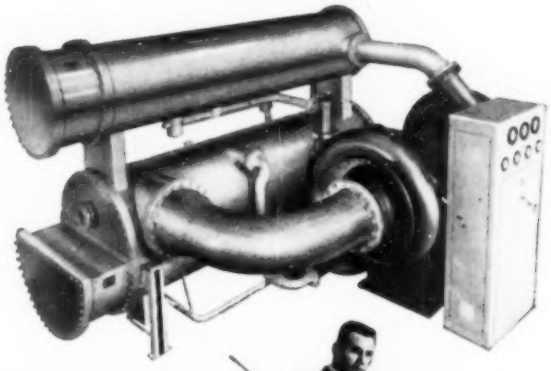
Here's a gravity-feed conveyor so flexible that it twists around equipment, poles, or any other obstruction. It's tailor-made to any length, easily adapts to changes. "Fabri-Flex" consists of spring steel side and ride rails that provide structural strength. Rails of highly polished steel minimize wear from friction, require little maintenance. Installation needs no special skills or tools. And it never becomes obsolete due to part change. Can be dismantled and sections re-used. *F. Jos. Lamb Co.* (Circle 125).

Turn the page

Climate by Chrysler

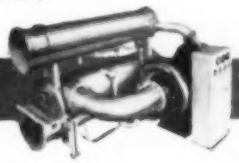
...most versanomical way to air condition anything!

Versanomical—that's the word for Chrysler's Centrifugal Water Chiller. It's versatile: engineered for any air conditioning project from 125 hp to the largest. And economical: packed with special engineering features that cut operating and service costs. For example:



1. **True volute casing.** A Chrysler design exclusive that minimizes refrigerant turbulence . . . reducing horsepower load on the motor.
2. **Adjustable guide vanes.** Unique airfoil design employs new principles to increase compressor efficiency to the maximum while maintaining operating stability.
3. **Automatic Operation.** Factory-assembled control console including all required safety controls, indicator lights and gauges.
4. **Automatic purger.** Removes non-condensable gases and water vapor. Prevents contamination of refrigerant system, cuts service costs.
5. **Interlocked lubrication.** System protects motor bearings with a constant flow of oil. Compressor can't run unless oil pump operates.

Chrysler Centrifugal Water Chillers are factory pretested under simulated operating conditions to assure peak performance. Why not get all the facts from your local Chrysler Applied Machinery and Systems sales office. Or write: Airtemp Division, Chrysler Corporation, Dept. U-79, Dayton 1, Ohio.



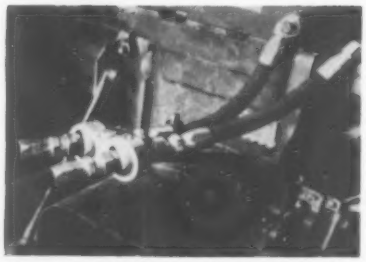
CHRYSLER AIRTEMP

FIRST WITH THE FINEST IN AIR CONDITIONING

For more facts Circle 493 on Reader Service Card

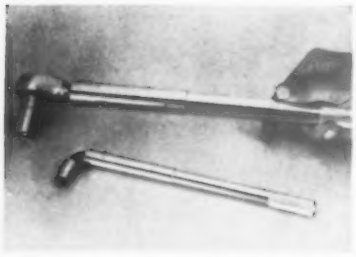
For more about these items, circle numbers on Reader Service Card next to back cover.

126—Floor Polisher, with electric motor off center, reduces force of backward thrust toward operator, and counter-balances handle weight. Results in ease of handling and precision control. These benefits may save up to 20% in labor costs over center-mounted machines. *Kent Co.*

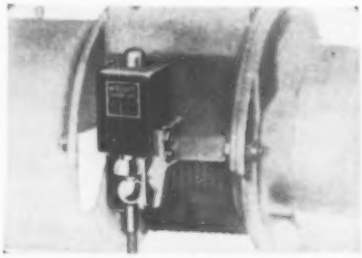


129—"Push-Pull" Hydraulic Coupling, for working pressures to 3000 psi., features "Swivel Breakaway Frame." Permits coupling to swing 30 deg. in all directions, thus no side thrust, wear, or leakage. Full fluid flow with only small pressure drop. *Aeroquip Corp.*

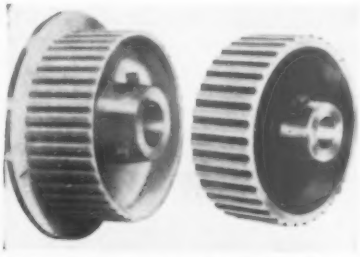
132—Orbital Sander has single-phase 115 v. a-c motor that insures constant operating speed. No need for belt or gears. High starting torque; overload-proof. One- or two-hand operation. Low maintenance; runs 1000 hr. before lubricating. *Sundstrand Machine Tool Co.*



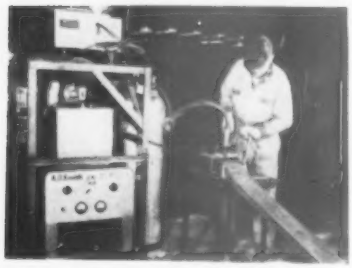
127—Torque Wrench has dual scale for in.-lb. or ft.-lb. settings without converting figures. Operator hears and feels wrench snap when pre-set torque is reached. Six models: smallest size ranges from 20 to 240 in.-lb.; largest, 200 to 600 ft.-lb. *Skidmore Engineering Co.*



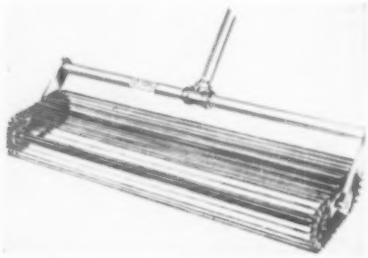
130—Overload Cutoff Unit for Wright Speedway Electric Hoists works mechanically as integral part of hoist frame. Instantly "breaks" raising circuit of hoist when overloaded, then load is lowered to floor and unhooked. circuit is restored. *American Chain & Cable Co.*



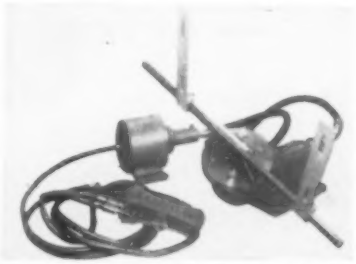
133—Pulleys, for flat belt drives, have corrugated surface, and are crown-faced. They are supplied in stock sizes from 3 to 12 in. in diameter. Come with or without flange. Corrugated surface of cast pulleys assures a positive drive. *Robert A. Main & Sons, Inc.*



128—"Button Weld" Attachment for CP-C-OManual welder, automatically controls button welds using bare wire and CO_2 shielding. Converts easily to semi-automatic. No helmet needed. Time variable from 3 to 360 cycles. For metals to 0.187 in. thick. *A. O. Smith Corp.*



131—Concrete Finisher cuts time and costs where hand tamper is normally used. Depresses larger aggregate below slab surface and brings thin layer of "paste" and semi-fine aggregate to surface. Slab becomes weather-resistant, less likely to spall. *Goldblatt Tool Co.*



134—Hydraulic Work Positioner, with finger-tip control, enables one man to easily handle 500-lb. workpieces. A pedal or hand control, connected to factory air supply, releases or locks in position the mounting piece onto which work is fastened. *Wilton Tool Mfg. Co.*

Turn the page

HYSTER INTRODUCES 3 new models on pneumatics

Challenger 60 70 80

Highest engine power in its class

POWER STEERING IS STANDARD

Functional design by Henry Dreyfuss

WORK INSIDE BOXCARS

Unequalled maneuverability

"WIDE-ANGLE" VISIBILITY

Exclusive design self-energizing brakes

SPEED: 17.4 M.P.H.
LIFT: 60 F.P.M. (Full Load)

Big pneumatic drive and steer tires

FULL LINE OF OPTIONS, ATTACH-MENTS

New Dual-Range POWER SHIFT HYSTAMATIC TRANSMISSION*

Developed for effortless operation under all operating conditions

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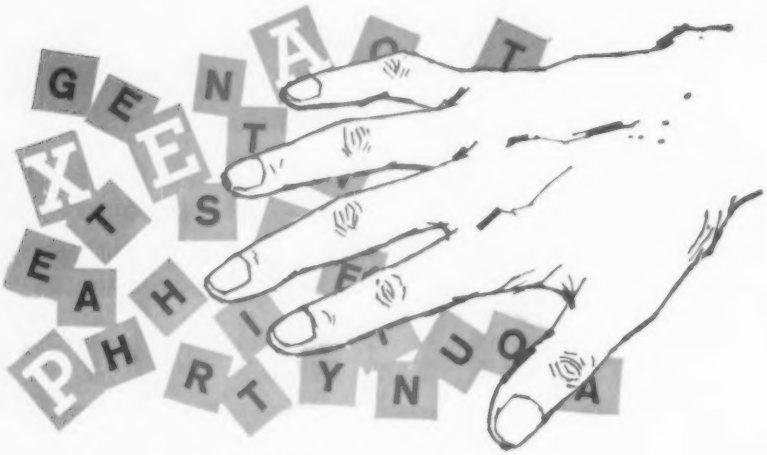
Your product isn't complete...



...until all the components...

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THE AUTHORITY ON FASTENING

...are properly assembled!

Assembly is one of the most important of all production operations. An efficient, economical assembly operation can depend upon your choice of the right fasteners and the right fastening tools.

Once you've selected the types of fasteners best fitted to your applications, you can select the correct fastening tools from the complete Apex line. For most applications, simply make your choice from the thousands of Apex standard or magnetic nut running and screwdriving tools available from stock. For special applications, just ask Apex—the authority on fastening—for practical assistance in solving your problems.

Write, on your company letterhead please, for

CATALOG 30-A—Nut Running Tools (up to 5/8" sq. dr.)
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The APEX Machine & Tool Co. • 1025 So. Patterson Blvd. • Dayton 2, Ohio

For more facts Circle 495 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 92

For more about these items, circle item numbers on Reader Service Card next to back cover.

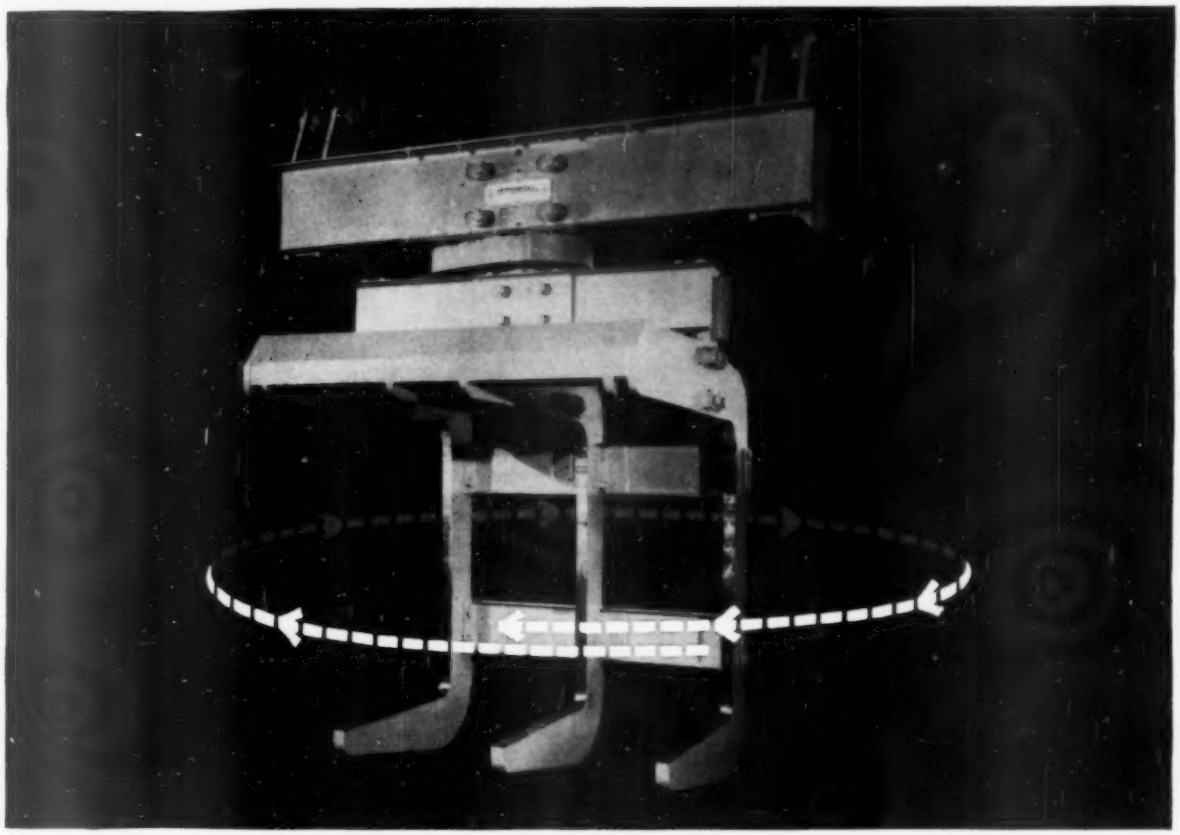
135—Hydro-Lift Crane is mobile for easy handling of heavy equipment. Has two-position boom, capacity up to 1000 lb., and lifting range from 16 in. to over 10 ft. "Little Oscar" eliminates costly, cumbersome overhead track-lifting equipment. *Star Machine & Tool Co.*

136—Compression Coupling eliminates need for threading and critical alignments. Pipe ends slip inside steel sleeve, then two compression nuts are tightened with 10- or 12-in. wrench to make permanent, leakproof, compact joint. In 3/8- to 2-in. sizes. *Joslyn Mfg. & Supply Co.*

137—Gas-Fired Intake Unit supplies tempered outside air to replace air removed by exhaust system. Almost 100% combustion efficiency. Automatically controls temperatures from 10 F. to 85 F. Roof- or wall-mounted. From 2- to 6-million Btu. per hr. *Hartzell Propeller Fan Co.*

Turn the page

NEW Heppenstall motorized slab lifters have continuous 360° rotation



Slabs may be rotated in either direction quickly and easily by this Heppenstall Slab Lifter.

With this lifter, up to 30 tons of steel slabs can be lifted and automatically rotated without limit in either direction. Spreader bars position the three high-tensile alloy steel C hooks on 32-inch centers. The rotating mechanism is contained within a double beam which has two bails on 8-foot centers for double crane hoist mounting. For maximum stability, the load is suspended from the rotator by a rigid, bearing-mounted shaft. The C hooks are counterbalanced to remain level at all times. For more information or a quotation, contact your Heppenstall Company Representative or Heppenstall Company, Materials Handling Division, New Brighton, Pa.

HEPPENSTALL COMPANY PITTSBURGH 1, PENNSYLVANIA

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Die Blocks • Forgings • Back-up Roll Sleeves • Rings • Industrial Knives • Materials Handling Equipment
Pressure Vessels • Hardened and Ground Steel Rolls

IF IT HANGS FROM A CRANE . . . HEPPENSTALL CAN HANDLE IT

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HOW CHROMALOX ELECTRIC HEAT

helps make it... and make it work

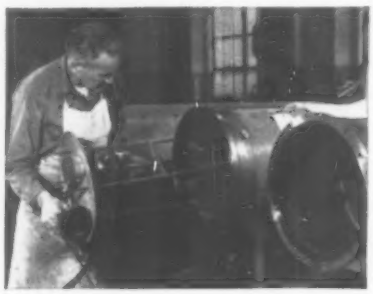
...the U.S. Navy's new Mark 32 fibre-glass torpedo launcher

From its unlikely beginning as a fibre-glass mat . . . to its successful operation in sub-freezing sea spray . . . the Mark 32 torpedo launcher testifies to the versatility and dependability of Chromalox electric heat. Designed and built by Apex Reinforced Plastics, division of White Sewing Machine Corp., this lightweight, corrosion-resistant launcher is now in service on Navy destroyer escorts.

Early in production, a Chromalox-heated hood is used in centrifugal molding of the launcher tubes.

First, a rolled fibre-glass mat is placed inside the mandrel, which is then engaged in spinning motion at 800 rpm. After thermosetting resin has been sprayed into the mandrel, the hood is lowered into position for heat curing. The Chromalox type RAD Far-Infrared Heaters have a total capacity of 36,600 watts, and work reaches approximately 200°F. in about 45 minutes. The hood remains on a total of about 3½ hours, throughout the spinning operation.

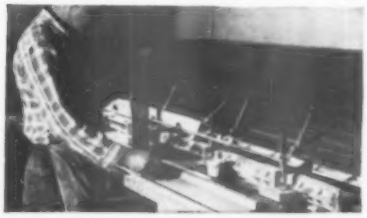
Before final assembly, each tube must have steel "nut bars" and "guide bars" cemented to its interior. (Nut bars connect the three tubes into one assembly; guide bars guide torpedoes into the launcher tube.) After these parts are cemented in place, two Chromalox Tubular Heaters wired in series set the cement.



Mounted in a frame which holds them in the center of the tube for its entire length, the 240-volt, 2750-watt heaters are controlled by a Chromalox type AR Thermostat. A small fan attached to the end cap circulates heat within the tube and eliminates condensation.

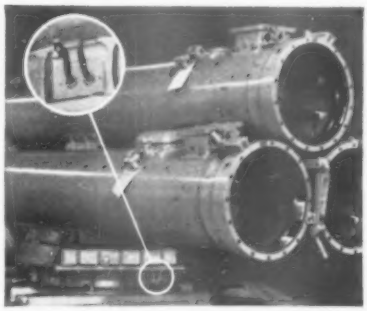
Next, four plastic quadrants are bolted to the tube interior, forming a liner to accommodate 12¾-inch torpedoes. To each quadrant are affixed two 101-inch Chromalox Flexible Woven Heaters.

After resin has been applied to the two channels in each quadrant, heaters are laid in place as shown below. The leads are then connected



to a power outlet and the heaters set the cement which bonds them in place. In action, these heaters maintain a protective 50°F. minimum temperature for the torpedo.

The closeup below shows two leads of a circular Chromalox Tubular Heater clamped in a groove around the launcher's swivel base. To prevent formation of ice in the joint between fixed and rotating parts of the base, this heater comes on automatically when the temperature drops below 50°F.



Plastic bottles, containing air at 2000 psi, provide pneumatic force to launch the torpedoes. Fabrication of these bottles, by the unique Apex filament winding process, involves still another Chromalox Heat application. After the plastic bottle has been formed around a Cerro-alloy ball mold, the alloy must be melted from the bottle's interior. Four sets of Chromalox Strip Heater Bands and a Chromalox Ring Heater provide booster heat on the steam-heated vat used for this purpose.

Perhaps one of these heaters, or one of the 15,000 other types, sizes and ratings of Chromalox Heaters can answer your need for heat. For personal assistance and specific recommendations, *Call your Chromalox Man for the Answers.* He's listed at the right.

7167

CHROMALOX
Electric Heat
INDUSTRIAL · COMMERCIAL · RESIDENTIAL
EDWIN L. WIEGAND COMPANY
7518 THOMAS BLVD. PITTSBURGH 8, PA.

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Mohawk 4-6113
Greenwood 3-4477

BALTIMORE 18, MD.
Paul V. Renoff Company
333 East 25th St.
Hopkins 7-3280

BINGHAMTON, N. Y.
R. P. Smith Co., Inc.
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Raymond 4-7703

BLOOMFIELD, N. J.
R. L. Faber & Assoc., Inc.
1246 Broad St.
Edison 8-6900
New York: Worth 4-2990

BOSTON 11, MASS.
Leo C. Pelkus & Co., Inc.
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Liberty 2-1941

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Niagara Electric Sales Co.
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Summer 4000

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Edison 4-4244
Franklin 5-1044

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P. O. Box 172
Amherst 5-3862

CHICAGO 5, ILL.
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Harrison 7-5464

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Trinity 1-0605

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P. O. Box 1376
Phone 3-7706

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Prospect 1-7112

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L. R. Ward Company
3009 Canton St.
Riverside 1-9004

DAVENPORT, IOWA
Volco Company
215 Kahl Building
Phone: 6-5233

DENVER 2, COLO.
E. & M. Equipment Co.
2415 Fifteenth St.
Glendale 5-3651
Genesee 3-0821

DES MOINES 14, IOWA
Midwest Equipment Co.
of Iowa
842 Fifth Ave.
Cherry 3-1203

DETROIT 38, MICH.
Carman Adams, Inc.
15760 James Couzens Hy.
University 3-9100

HOUSTON 3, TEX.
L. R. Ward Company
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Capitol 5-0356

INDIANAPOLIS 8, IND.
Couchman-Conant, Inc.
1400 N. Illinois St.
Station A, P. O. Box 88023
Melrose 5-5313

KANSAS CITY 8, MO.
Fraser D. Moore Co.
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Victor 2-3306

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Montgomery Brothers
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Richmond 7-5191

MIDDLETOWN, CONN.
Dittman and Greer, Inc.
S. Main St. Extension
P.O. Box 780
Diamond 6-9606

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Gordon Hatch Co., Inc.
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Broadway 1-3021

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Emerson 1-2900

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Atlantic 8-8758

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Hamilton 6-2070

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Howard 3-2748

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Room 211 Derby Building
352 N. Broadway
Amherst 2-5647

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1010 Schaff Building
Philadelphia 2, Pa.

FACTORY / EQUIPMENT NEWS

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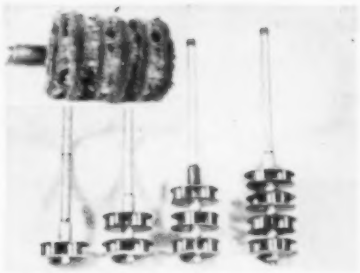
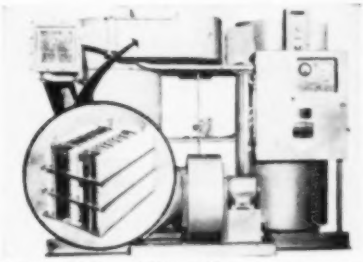
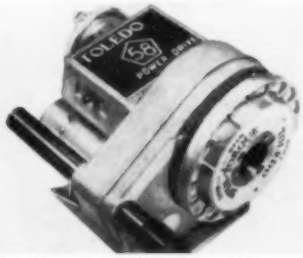
For more about these items, circle item numbers on Reader Service Card next to back cover.



138—"Tank-Trapper", consisting of 3 Alnico V. magnets and 2 pole pieces, removes particles from hydraulic reservoirs. Single or multiple units for 10- to 350-gal. tanks. Fits 2-in. pipe flange opening. Collected metal (insert) is blown off with compressed air. *Kebby Co.*



139—Dehumidifier/Dryer prevents deterioration of material in warehouses, storage areas. Maintains low relative humidity by removing up to 30 lb. water per hr. Uses Trent heating plugs with maximum frame temperatures to 1350 F.; 120-600 v. *Cargocaire Engineering Corp.*



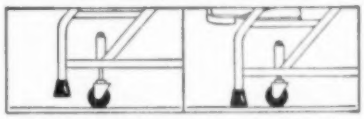
140—Power Drive, weighing only 73 lb., handles pipes or conduit from ⅛ to 2 in., rods and bolts ¼ in. or larger. Enclosed jaws of chuck prevent chips falling into moving parts, minimize danger to fingers. *Toledo Pipe Threading Machine Co.*

Turn the page

EASY ROLLING SAFE TO USE!

BALLYMORE
Safety-Step LADDERS

PYRAMID DESIGN
automatically centers the body, and automatically locks to the floor. An exclusive Ballymore design.



With and without handrails, all-welded construction . . . your choice of steel, or aluminum.

For complete information, write:
BALLYMORE COMPANY
WEST CHESTER 23, PA.

BALLYMORE
EQUIPMENT FOR ABOVE-FLOOR SAFETY

LOOK FOR THIS LABEL TO BE SURE IT'S THE BEST

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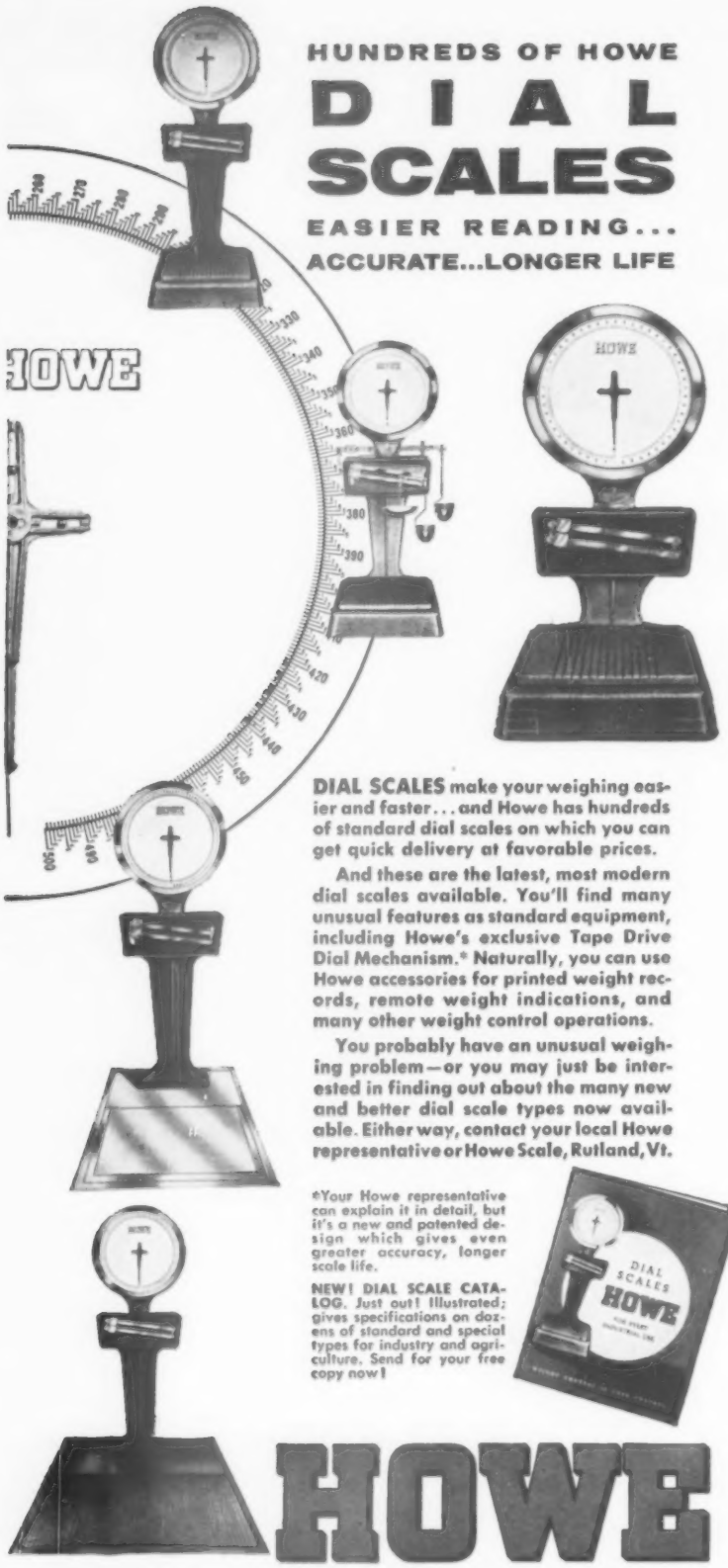
HUNDREDS OF HOWE

DIAL SCALES

EASIER READING...
ACCURATE...LONGER LIFE



DIAL SCALES make your weighing easier and faster... and Howe has hundreds of standard dial scales on which you can get quick delivery at favorable prices.

And these are the latest, most modern dial scales available. You'll find many unusual features as standard equipment, including Howe's exclusive Tape Drive Dial Mechanism.* Naturally, you can use Howe accessories for printed weight records, remote weight indications, and many other weight control operations.

You probably have an unusual weighing problem—or you may just be interested in finding out about the many new and better dial scale types now available. Either way, contact your local Howe representative or Howe Scale, Rutland, Vt.

*Your Howe representative can explain it in detail, but it's a new and patented design which gives even greater accuracy, longer scale life.

NEW! DIAL SCALE CATALOG. Just out! Illustrated; gives specifications on dozens of standard and special types for industry and agriculture. Send for your free copy now!

HOWE

THE HOWE SCALE CO. • RUTLAND, VERMONT
A SUBSIDIARY OF SAFETY INDUSTRIES, INC.

FACTORY / EQUIPMENT NEWS

Begins on page 92

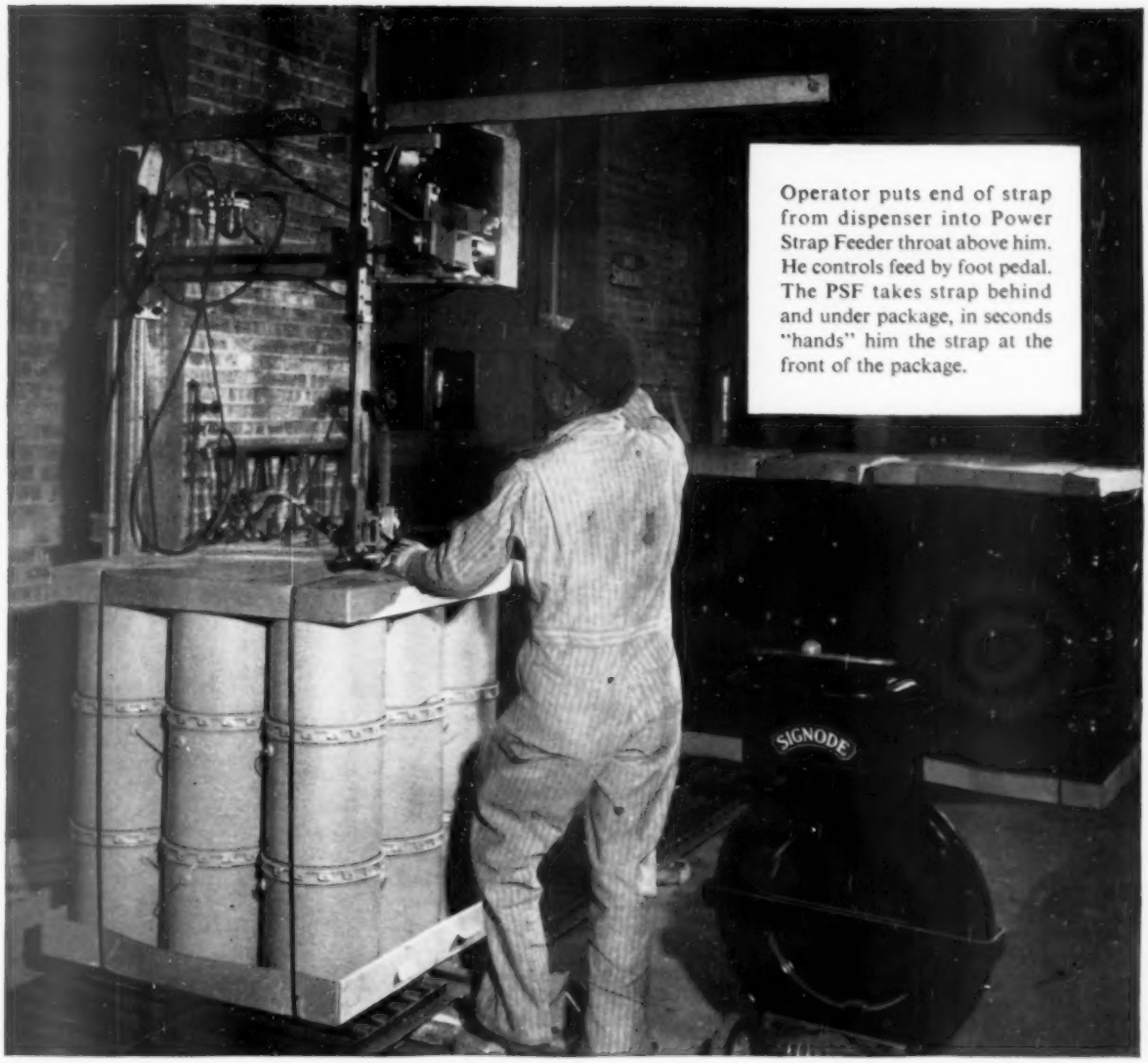
For more about these items, circle item numbers on Reader Service Card next to back cover.

141—Portable Window Platform, for window-washers, painters, maintenance men, fits windows up to 7 ft. 6 in. wide. Weighs 32 lb., has 800-lb. capacity. It rests on outside sill, while telescoping steel tube holds it on inside. *Albert W. Pendergast Safety Equipment Co.*

142—"Powerupter" Unit for switchgear interrupts 600-amp. loads with no external arcing or smoke, and without using gas or oil. Self-contained, it needs no maintenance during normal life. Also available for outdoor switches with voltages to 34.5 kv. *H. K. Porter Co.*

143—Safety Switch may be used for negative or positive pressure, or difference between two. Diaphragm-actuated, it has microswitch which opens or closes circuit when fluid or gas pressure drops or rises. Fail safe: level mountings not critical. *Dewey Gas Furnace Co.*

Turn the page



Operator puts end of strap from dispenser into Power Strap Feeder throat above him. He controls feed by foot pedal. The PSF takes strap behind and under package, in seconds "hands" him the strap at the front of the package.

Simple, low cost way to unitize bulky loads

Cost control can be especially important in packaging big, light loads for shipment—like empty pails. The combination of a low cost Power Strap Feeder, adjustable for package size, with a Signode air-powered strapping tool that quickly tightens the strapping to a pre-set tension does the job for Vulcan Containers, Bellwood, Illinois.

This power feeder and tool combination is winning new and enthusiastic acceptance in nearly every industry.

It is fast. It saves one man on big packages in every case we know of because it eliminates a stand-and-wait helper's job. And it's simple, versatile. Cost: modest—saves enough to pay for itself from the start.

Let a Signode man get you the facts about your application, or send for more information from:

SIGNODE STEEL STRAPPING CO.

2663 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide

In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

First in steel strapping

For more facts Circle 500 on Reader Service Card

New way to spray finishing materials

for touch-up or decoration

Standard Kit
$14.95 (suggested U.S. retail price)
Contains Wren Air-Brush and ¾ oz. color bottle.

Custom Kit
$19.45 (suggested U.S. retail price)
Contains extra ¼ and 2½ oz. bottles and air hose.

Whether you are finishing hand-crafted products or are a mass producer needing a deft instrument for touch-up work . . . here is a new air brush that does the trick, and it is made by Binks.

A spray gun in miniature. Binks Wren Air-Brush applies enamels, lacquers, stains, dyes . . . any material that can be sprayed. It has fine air and fluid adjustments which give the operator complete application control.

No masking needed. You can dot an "i" with the Wren or blend larger areas with such fine control that masking is seldom needed. Saves time before application and after, too.

Fast color changes. Where many different colors or materials are applied, the quickly interchanged color bottles are a natural. A simple pull detaches one bottle, a push inserts another.

Send today for free Bulletin. See for yourself the many special features of the Binks Wren Air-Brush . . . also a new, whisper-quiet air compressor. Ask your Binks industrial distributor for Bulletin A59-1R or write direct to the address below.

Ask about our spray painting school
Open to all . . . NO TUITION . . . covers all phases.

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FACTORY / EQUIPMENT NEWS

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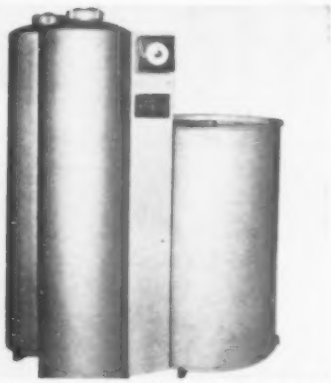


144—Water Conditioners automatically provide refined and softened water for same price as manual units. In capacities from 30 to 180 gpm. based on 40 psi., units produce 10,000 gph. Modular design permits installation flexibility; one unit requires 10 sq. ft. *Water Refining Co.*

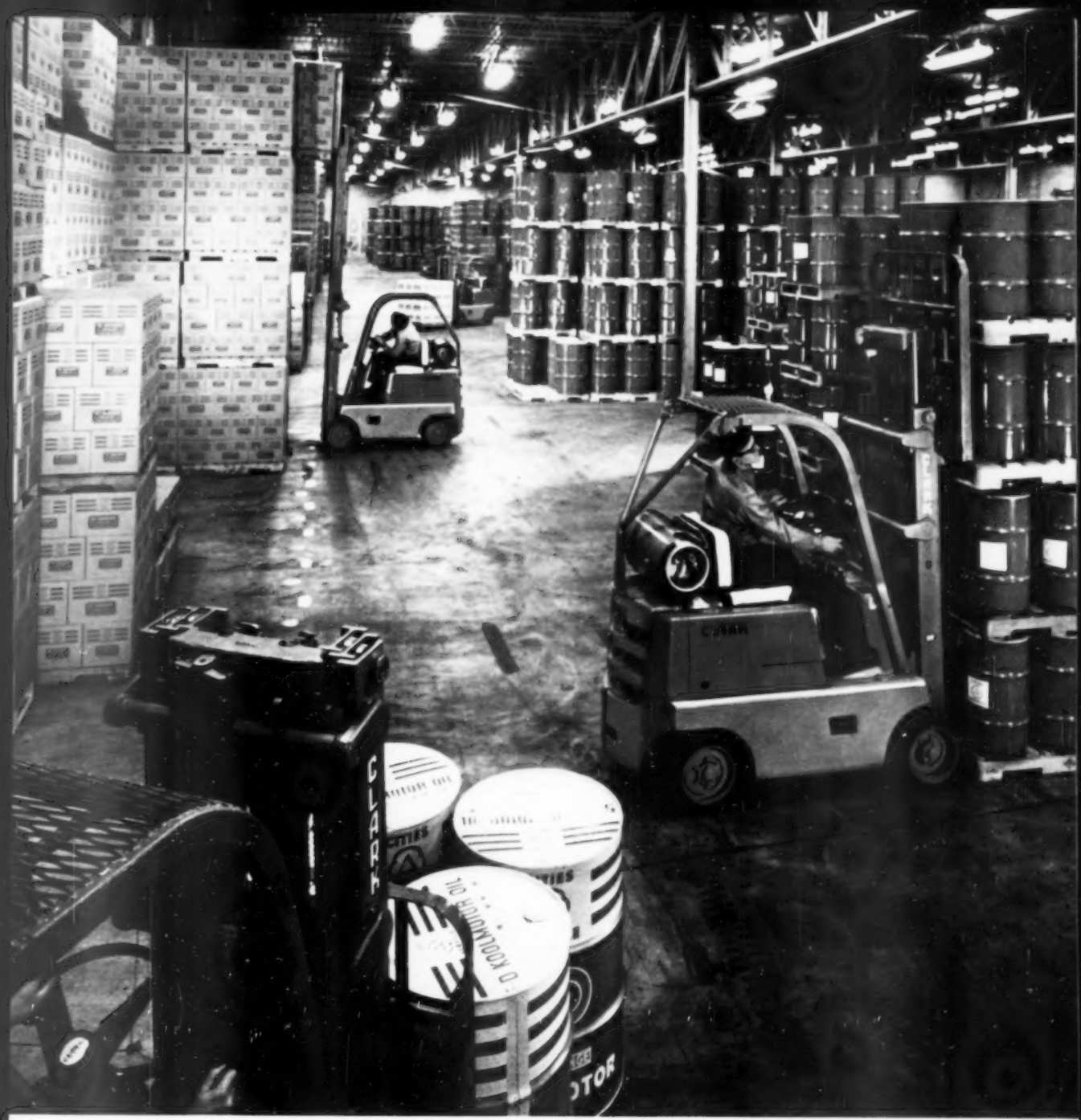
145—Control Panel automatically turns on and off heating and air conditioning motors, audible signals, lights, etc. "Scope" works either electronically without extra wiring or by synchronous operation with system wiring. Controls up to 640 circuits. *Stromberg Time Corp.*

146—Tiering Truck, electric 2000-lb.-capacity rider-type, has hydraulically extendable forks. Does not straddle, but positions before load. Forks extend into pallet, lift load, then retract over wheels into truck. Lifts 48-in. loads to 118 in. *Lewis-Shepard Products, Inc.*

Turn the page

For more facts Circle 501 on Reader Service Card

For more facts Circle 502 on Reader Service Card ➤



You're paying for new trucks...why not own them?

Times change. So does equipment efficiency. The new *Clarklift* fork trucks pictured above, for example, have been tested and proved to be 30% more efficient than the average truck in use today. Over four years of designing, testing, and field-proving has demonstrated time and again that *Clarklift* owners get a fast return on their investment in extra production alone.

And, of course, if you have old equipment, there's the high cost of maintenance to consider. If your present trucks are frequently down for repairs, you're paying dollars not only for the parts and labor involved, but you're also paying for lost production, supply and shipping bottlenecks, poor use of manpower. It all adds up. It means you're paying for new equipment every day . . . *but without owning it.*

A planned equipment replacement program is worth investigating. Simply write: Planned Replacement, Clark Equipment Company, Battle Creek, Michigan. We'll arrange to have a representative call to survey your operation and explain the various programs available.

CLARK® EQUIPMENT

CLARK® is a trademark of Clark Equipment Company

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MSA reports on:

How Air Filter Efficiency Is Tested

MSA presents the following information in a spirit of helpful enlightenment. It's directed to those of you in industry who want to know more about air filter efficiency and how it's determined. A review of this report may pose a question or two in your mind. We hope you will write us for answers to your specific air cleaning problems.

TESTS BASED ON WEIGHT—Efficiency equals total weight of dust in unfiltered air stream divided into total weight of dust stopped by filter, times 100.

The best known weight tests used today are the ASHVE and Bureau of Mines procedures. Both use prepared "standard" dusts of relatively large particle diameter. Most sources agree that "atmospheric dust" would be the most representative material to use on a weight test for space filters. But so far, the average atmospheric dust condition has not been selected. Type of material, concentration, particle size, etc., varies widely from one location to another. And even within the same location from time to time.

TESTS BASED ON DISCOLORING—Efficiency is found by comparing previously rated standard stains.

These tests follow the practice of comparing stains produced on white filter paper by the exit of air from the filter being tested with a series of known standards made by staining papers with different volumes of untreated aerosols.

Comparisons are made visually or by a densitometer (degree of light penetration). NBS or ASHVE dusts are most frequently used on these tests although some reports are based on use of atmospheric dusts.

Efficiencies reported by discoloration are usually lower than those reported by weight; but considerably higher than those obtained by count.

TESTS BASED ON COUNT—Efficiency equals total number of particles in unfiltered air stream divided into total number of particles stopped by filter, times 100.

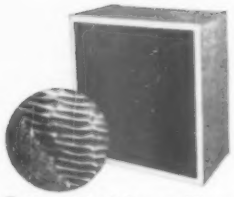
Efficiencies obtained by count are the most exacting measure of a filter performance since large and small particles are rated equally. They can be counted by means of a microscope or by light scattering techniques.

The most critical standard test and the most difficult for any particulate filter is the Chemical Corps DOP test on which penetration of the 0.3 micron diameter smoke particles is evaluated by particle count.

The DOP Penetrometer, used on the M-S-A UltraAire Space Filter, is now considered the most convenient tester available. It is sensitive to penetrations as low as 0.001% by count. It's sometimes difficult to appreciate the difference between 99.95% efficiency and 99.90% efficiency.

TESTS BASED ON RADIOACTIVITY—Efficiency equals radioactivity of unfiltered air stream divided into radioactivity of particles stopped by filter, times 100.

One of the earlier tests on this basis involved the use of triphenyl phosphate containing radioactive sulphur. This or like materials in a uniform aerosol are passed through filter paper or pads, and segments of these are analyzed with a Geiger Counter or some other similar instrument. Such test procedures are still confined primarily to AEC activities.



M-S-A® UltraAire* Space Filter

Light weight, fire-resistant, unusually strong, and ideal for high humidity service. Individually pre-tested and proved at least 99.97% efficient in removing particles of 0.3 micron diameter.

M-S-A® Cylindrical-Type UltraAire* Space Filter

Honeycomb-type fold without separators is admirably suited to cylindrical element construction. This shape is preferred for pressure systems. Weighs only one pound. Easy to handle. Inexpensive to ship.

M-S-A® Dustfoe* Space Filter

Offers the efficiency of an Electrostatic Precipitator without the high cost and without the possibility of arcing "blow-off." 85-95% certified efficiency on NBS Atmospheric Air Dust Stain Rating.

M-S-A® Air-O-Kay* PreFilter

Impingement type panel prefilter which can be used oiled or dry to remove lint and other large air-borne particles from the atmosphere. 60-70% certified efficiency on NBS Stain Rating.

*Trademark

Write for illustrated technical bulletins on M-S-A Space Filters related to your particular system problem. Ask an MSA Representative for system recommendations.

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MINE SAFETY APPLIANCES COMPANY

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Other Fluid Purification Equipment includes catalytic filters for jet aircraft cabin air; air separation plants; inert gas generators, space capsules; bomb shelters; air line filters; jet fuel and hydraulic fluid purification.

For more facts circle 503 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 92

For more about these items, circle item numbers on Reader Service Card next to back cover.

147—Two-Way Radiophone uses tone coding to block out messages from other systems. "Handie Talkie" portable comes in both 25-50 mc. and 144-174 mc. frequency bands. Battery standby drain is under one amp. Transistor-powered. *Motorola Communications & Electronics, Inc.*

148—Pipe, Valve, Cable Locator determines place and depth of metallic objects. Transistorized unit has transmitting and receiving coil cast into glass fiber case. Its four flashlight batteries have 1400 hours of life. Built-in battery tester. *Gardiner Electronics Co.*

149—Three-Way Lamp balances incandescent and fluorescent light in one fixture. Either type can be used individually or in combination for comfortable illumination. Output of 500 ft.-candles at 12 in. using 60-watt bulb, 22-watt fluorescent tube. *Luxo Lamp Corp.*

Turn the page

These labels can't come off

They're facsimile labels. You print them directly on cartons. Saves cost of real labels. Faster than brush stenciling. Cuts shipping losses.

Here's a fast, systematic way for addressing multiple shipments. In one easy motion, you can imprint both a facsimile label and customer's address directly on a carton. 30 to 40 cartons can be addressed in a minute. No labels to type or apply; no ink brushes and stencilboards to wield. Facsimile labels are sharp and clear, yet can be easily blocked out for re-handling by consignee.

All that's needed is a Weber handprinter and Kustom-Kut stencil. Stencils are die-cut with facsimile of your label. All you do is type the customer's address on the stencil and attach to the printer. Fast, neat, systematic and inexpensive. Write for full details on the Weber Facsimile-Label System.

Good for product identification marking too.

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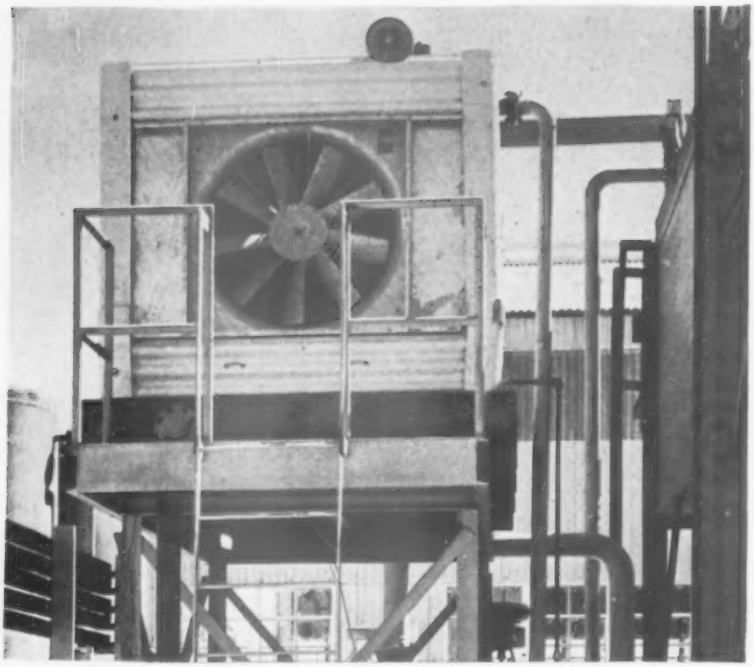

MARLEY AQUATOWER®

adds the punch that changes a

Hot Spot to a Profit Spot

Marley Aquatowers (there are a broad range of types and capacities) are adaptable to many unusual services that add flexibility and profitability to plant operation. The one pictured here is working "in series" with a large air-cooled heat exchanger. After the exchanger has reduced water temperature sufficiently for major requirements, a portion of the flow is cooled further by the Aquatower for a minor but important plant function.

In every plant there are "hot spots" that Aquatowers can change to "profit spots." Any service requiring 25 gpm or more can usually benefit from water at uniform temperature supplied by Aquatowers, and *conservation carries the cost.* Aquatowers are in use throughout industry today providing cooling water for such varied requirements as welding equipment, molding presses, quenching operations, air-conditioning, refrigeration, processing, etc. Their initial cost, as well as installation and operation costs, is so low that they make water wasting impractical and unprofitable.

Get complete information on all types and capacities of Marley Aquatowers (there is one that is pinpointed for your job) from the Marley engineer in your city or write to

MARLEY

The Marley Company

Kansas City, Missouri

FACTORY / EQUIPMENT NEWS

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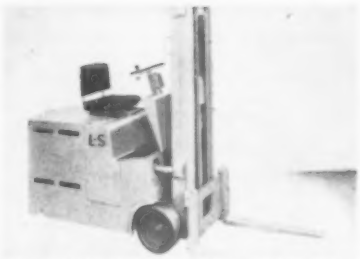
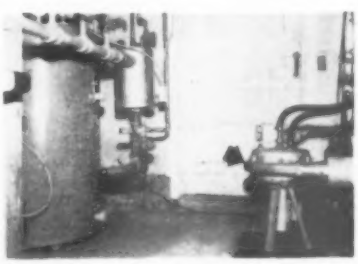
For more about these items, circle item numbers on Reader Service Card next to back cover.



150—Lift Truck with "Inchomatic" drive system can move forward with a full load an inch at a time. Exact load spotting and absolute control is possible under all conditions. In 30 models, 2 mast types, capacities from 1500 to 4000 lb. *Lewis-Shepard Products, Inc.*

151—Non-Sparking Lifting Hook of manganese bronze handles drums of volatile liquids, up to 1000 lb., in hazardous areas. It connects to ring holding hooked-end brass rods. Hooks grip ¾-in. rim on standard 55-gal. drums and those up to 34 in. long. *Morse Mfg. Co.*



152—Steam Generator (arrow) is ⅙ size of conventional unit (left) of equal capacity (10 hp.). Delivers 100 psig. steam in 15 sec. from cold tap water; produces 300,000 Btu. per hr. Can be set on floor, or mounted vertically or horizontally in 8 cu. ft. *Turb-O-Heat, Inc.*

Turn the page

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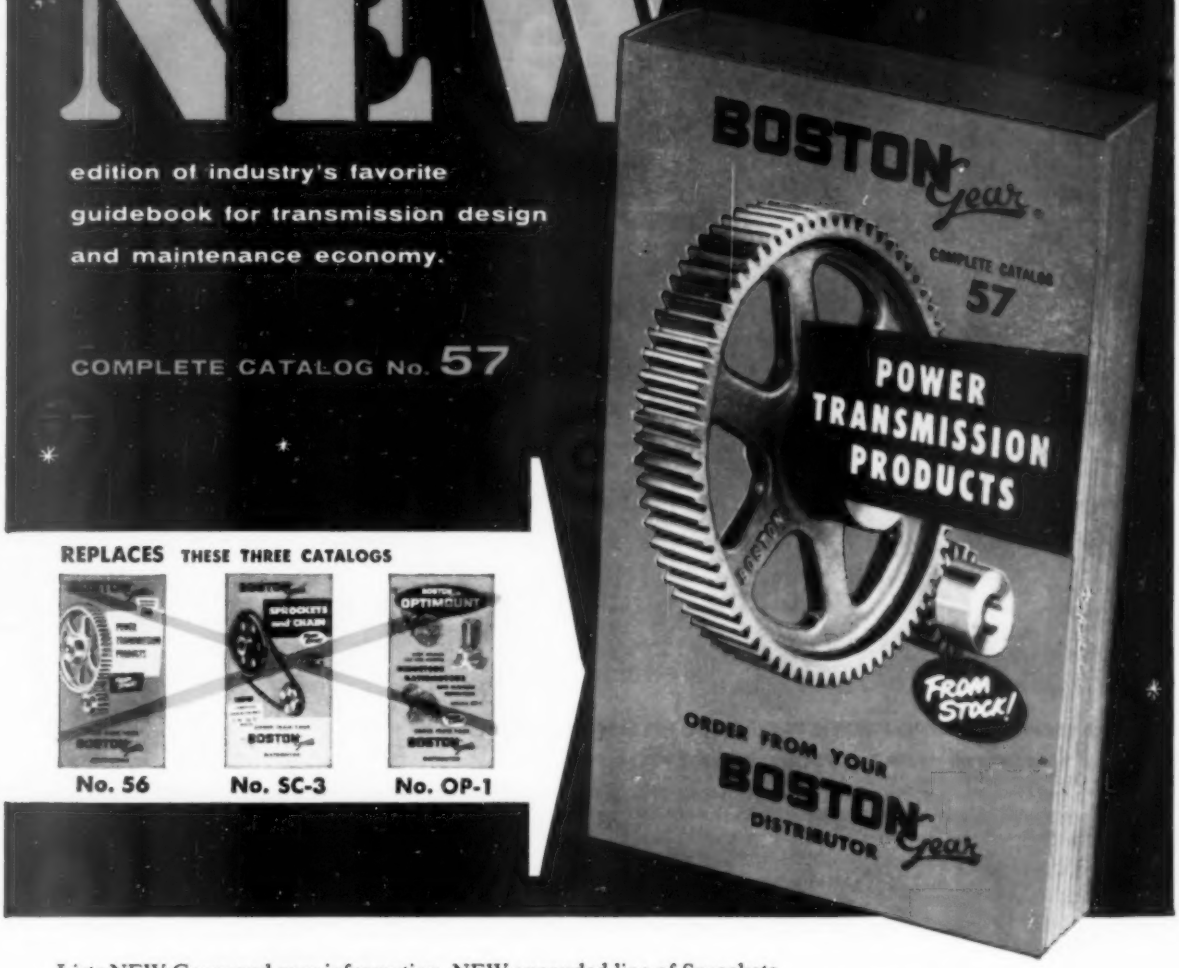
NEW

edition of industry's favorite guidebook for transmission design and maintenance economy.

COMPLETE CATALOG No. 57



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No. 56

No. SC-3

No. OP-1

Lists NEW Gears and gear information. NEW expanded line of Sprockets and Chain for any drive ¼″ to 2″ pitch. NEW OPTIMOUNT helical geared Speed Reducers, shaft mounted and base mounted. NEW types and sizes in every product line. 664 pages, with 58 pages of improved selection charts and engineering information to help you simplify transmission planning. Boston Gear Works, 62 Hayward St., Quincy 71, Mass.

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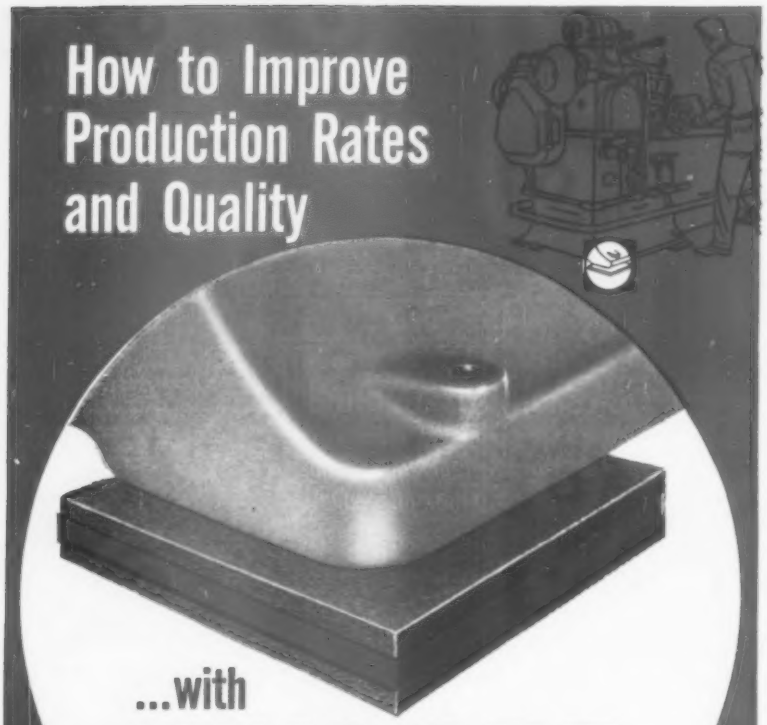
How to Improve Production Rates and Quality



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2-in-1 Machine Mounts

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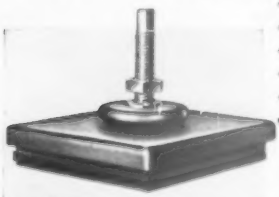
- **MAXIMUM VIBRATION CONTROL**

Unisorb and Unisorb Level-Rite Mounts are used to control the "vibration personality" of different machine types and loadings, and make them operate more efficiently. See how these features can help you . . .



- Absorbs up to 85% of transmitted vibration
- Allows maximum operating speeds
- Improves quality, cuts rejects
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- Eliminates bolts and lag screws, no floor damage
- Saves from 30 to 75% — by actual report — in installation time

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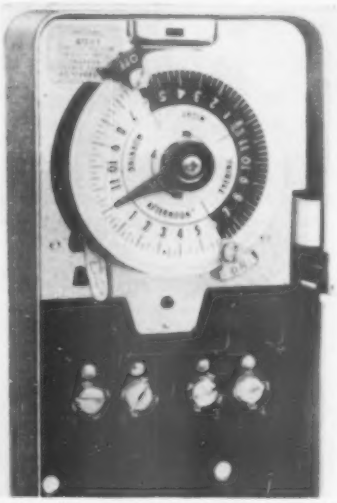
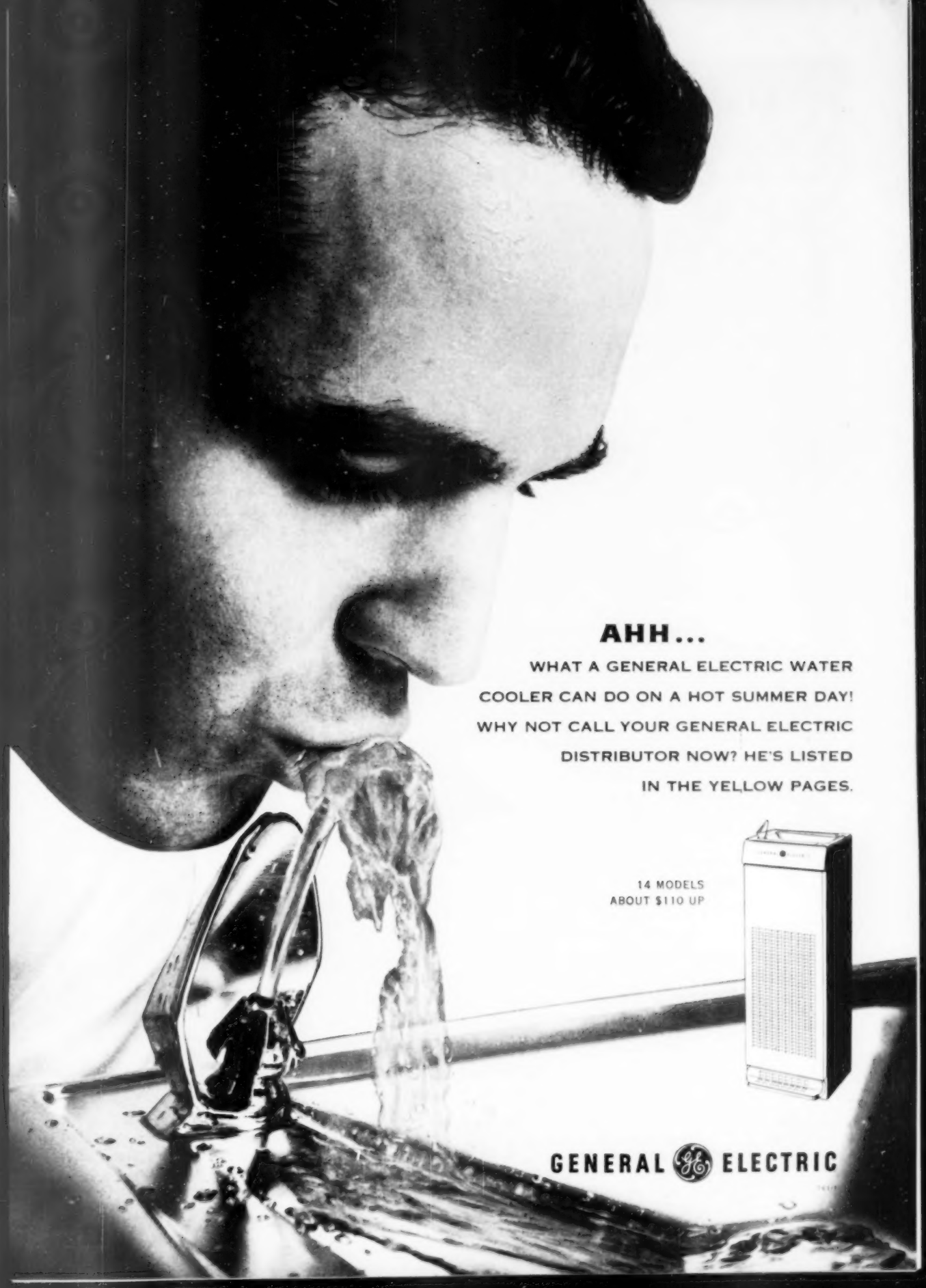


153—Time Switch, 40 amp., 120/240 v., is for pumps, blowers, motors, heating and air conditioning, signal systems, irrigation and filter systems, etc. Provides highest capacity available in low-cost units. Uses free-floating make or break contacts. *Paragon Electric Co.*

154—Temperature Regulator instantly responds to less than 1/10 of a degree change at bulb. Works by throttling action of valve on steam or water line. Sizes: ½ to 2 in; ranges: from −15 F./50 F. to 240 F./350 F. *Manning, Maxwell & Moore, Inc.*

155—Walkie-Rider Tractor can be used either way at speeds from 3 to 6 mph. Six models, with 12-, 24-, or dual 12/24- volt system, have operating controls and horn in single handle. Besides footbrake, has controlled plugging, dynamic braking. *Lewis-Shepard Products.*

Turn the page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What's more economical—more practical—than a paper bag? Or more *versatile?* They're proving it every day for manufacturers of items ranging from fittings . . . to furniture parts.

Bower Roller Bearing Division of Detroit, Michigan, for example, formerly packed their bearings in chipboard tubes. Now (see above) the company uses paper bags. Result? Impressive savings in packaging materials. Reduced warehousing costs. Faster handling and packaging speeds.

Why not look into the many advantages of putting *your* products in low cost paper bags. Write for free booklet FM-111.

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FACTORY / EQUIPMENT NEWS

Begins on page 92

For more about these items, circle item numbers on Reader Service Card next to back cover.

156—Static Relay, for switchgear, is first major departure from mechanical induction disk design. Transistorized unit is ⅓ size of predecessors, costs about the same. Plugs in; no current transformer shorting switches, no moving parts. *Allis-Chalmers Mfg. Co.*

157—Scraper, with replaceable blades, is low-cost tool for cleaning floors, paint booths, ovens, other large surfaces. Also levels expansion joints in concrete floors. In 3½- and 7-in. blade widths, with 66-in. handle for easy operation. Under $8. *Aeroil Products Co.*

158—Sandblaster removes rust, paint, dirt, grease, and stains from any surface, including upholstery. Does not nick, slice, or penetrate metal. Portable unit operates with tank-type air compressor at 90 to 180 psi. Abrasive capacity: 12 qt. *Malray Products, Inc.*

Turn the page

You're invited to see how grease affects your profit picture

Texaco has produced a film called "Shear Magic". It explains why and how grease has kept pace with technical advances in your plant.

Like everything else, grease is no longer simple.

How could it be. In industry, heat is hotter and cold is colder. Speeds are faster, pressure heavier. All the more reason why you'll find this film interesting.

"Shear Magic" is not a sales film.

It is devoted entirely to helpful information about greases. You will see how only the right greases protect against heat, water, cold, dust, shock and other problems in a modern plant. You will learn how the right grease schedule – one planned exactly for your operation – can help you control costs.

If you'd like to switch off the lights and view this film, mail the coupon today.

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FACTORY / EQUIPMENT NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

159—Shredding Machine breaks up compressed bales of excelsior into soft, resilient material adaptable for delicate packaging. Portable unit saves time and money over manual shredding. Versatile, it can shred insulation, paper, peat moss, and soil. *Kemp Mfg. Co.*

160—Spraying Nozzle gives flat atomized spray at exactly controlled volume, which is said to be lowest designed. This hydraulically operated unit has low capacity of 2/3 gph. at 40-lb. pressure. Useful for continuous mixing and coating operations. *Spraying Systems Co.*

161—Liquid Pumps (two of "Pacer" series of five pumps) provide better flow with less air for pumping heavy material, paint, and buffing compounds out of containers or drums. For cold process roofing, sound deadening material, mastic; 1.25 gpm. at 10 cycles. *Binks Mfg. Co.*

162—Ultrasonic Welder makes welds in small parts and delicate assemblies without melting or fusion. Since no electrical current passes through parts, contamination of surrounding areas by sputter, spatter, or arcing is eliminated. Capacity 100 watts. *Aeroprojects, Inc.*

Turn the page

Now! Air and electric tools of proved torque accuracy!

ELECTRIC POWER screwdrivers and nutsetters with Thor Uni-Tork mean longer service life, less wear and tear on the unit—infrequent torque adjustments, and quiet operation. Thor electric Uni-Tork tools can be purchased from industrial distributors. Ask for a demonstration.

AIR POWER tools with Thor Uni-Tork have external torque adjustments from 10 to 100 inch-pounds. Thor No. 2 screwdrivers and nutsetters (illustrated) are equipped with Silentair mufflers which reduce exhaust noise by 75%. Uni-Tork tools remove operator judgement from fastener work.

THOR UNI-TORK

Leading air frame manufacturer chooses Thor over all

After exhaustive tests in their own research laboratories, one of the nation's leading air frame manufacturers, now specifies only Thor air and electric screwdrivers and nutsetters for precise torque control.

Air frame manufacturing requires exact torque control tools. And Thor Uni-Tork delivers.

Thor Uni-Tork tools mean increased production on the assembly line. When the desired preset torque is reached, Uni-Tork tools snap out of adjustment—no slipping or buzzing of clutch jaws. You get ease of operation and automatic torque control. Just set and forget. With Thor Uni-Tork tools on the job, work with fasteners is as simple as turning on a light switch.

Thor PORTABLE POWER TOOLS

THOR POWER TOOL COMPANY, AURORA, ILLINOIS

BRANCHES IN ALL PRINCIPAL CITIES

For more facts Circle 512 on Reader Service Card

Here's why you get

MORE in a PAYLOADER®

1. Distributor Experience: The oldest, largest, most experienced and best equipped organization in the rubber-tired tractor-shovel field sells and services the 'PAYLOADER' line.

2. Design Experience: Almost every "FIRST" in both two and four-wheel-drive rubber-tired tractor-shovels is the result of HOUGH pioneering.

3. Application Experience: There have been more 'PAYLOADER' integrated rubber-tired tractor-shovels built and in use than all other makes combined.

4. Quality: HOUGH builds only the best with the highest standards for all materials, processing, components and finished machines. Every unit is tested on special chassis DYNAMOMETER.

5. Safety: Boom arm design and position on all four-wheel-drive 'PAYLOADER' models keeps all moving members away from the operator's area.

6. Stability: Exclusive "balanced-design" reduces "deadweight", gives more productive horsepower-to-weight ratio and reduces material spillage.

7. Easy Operation: Power brakes, power-steering and power-shift transmissions, standard on most models, plus torque-converter drive make HOUGH machines easy to operate, reducing fatigue.

8. Premium Materials: HOUGH has inaugurated the use of high-strength, light-weight steel like USS "T-1" giving added strength with less weight in boom arms.

9. Extra Wear: Hydraulic piston rods of heat-treated forged steel with more than twice the chrome plating of most units. Cylinders are tested at pressures in excess of maximum loads.

10. Economy: Lower costs of operation, less down-time, less depreciation and better distributor facilities make 'PAYLOADER' tractor-shovels a MORE PROFITABLE investment for your money.

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THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

Send information on all PAYLOADER models and attachments

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Title
Company
Street
City State
Fo 7-8-2

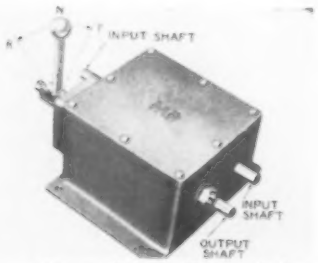
FACTORY / EQUIPMENT NEWS

Begins on page 92

For more about these items, circle item numbers on Reader Service Card next to back cover.

163—Depth Gage measures within ±0.005 in. the thickness or diameter of any product run through it. Material passes between two rollers —bottom stationary, upper movable. Light shows when maximum or minimum tolerances are reached. *Wire Insulating Machinery, Inc.*

164—Compressed Air Filter separates rather than adsorbs moisture, oil, and contamination. Easily installed unit uses up to 125 psig. Rated at 20 cfm. with low initial pressure drop. Oil and water can be drained periodically; cartridge changed quickly. *Fram Corp.*



165 — Reversing Transmission smoothly, instantly clutches into forward and reverse by single-action lever. Good work horse for machine tools, material handling equipment, maintenance machinery. No "stop" necessary to change direction. *Mentor Products, Inc.*

Turn the page

OVER 1500 ITEMS
for Business, Industry and Institutions

THIS CATALOG ILLUSTRATES THE WORLD'S MOST DIVERSIFIED LINE OF STEEL EQUIPMENT *IT'S FREE!*

★QUALITY PROTECTED BY LYON "POINT-CHECK" SYSTEM

✓ FABRICATING | ✓ ASSEMBLING
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Look for the "QP" on every Lyon Carton. It is your assurance of quality equipment.

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STEEL EQUIPMENT

New RIDGID® No. E-110 Offset Hex Wrench

Maximum jaw opening across flats 2⅜"... handles up through 1½" drain nuts.

Extra-wide Jaw Opening . . . Short Handle make work easy on sink and tub drain nuts!

Here's a real time saver. This latest addition to the RIDGID Hex Wrench line is especially designed with an extra-large opening offset jaw that gives easy-on, non-slip grip on sink and tub drain nuts . . . all other hard-to-get-at nuts and fittings. Thin, smooth jaws slip into tightest places . . . won't mar highest chrome finish. Short handle makes work easy in close quarters. Multi-sided grip allows extra leverage . . . no more rounded nut shoulders or bruised knuckles.

Famous heavy-duty RIDGID construction. Alloy malleable housing guaranteed against warping or breaking. Comfort-grip handle has handy hang-up hole.

Save time on every job . . . order your RIDGID No. E-110 Hex Wrench from your Supply House!

RIDGID

The Ridge Tool Company, Elyria, Ohio, U.S.A.

For more facts Circle 515 on Reader Service Card

FACTORY / EQUIPMENT NEWS

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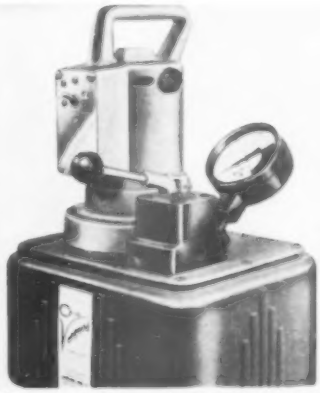
For more about these items, circle item numbers on Reader Service Card next to back cover.

166—Motor Starters, 2 to 5 kv., are oil-immersed, explosion-proof, corrosion-resistant, for hazardous locations. Two models: frame-mounted tank lowering type (above) and floor-mounted lift-out type. Rated 400 amp., 50-mva. interrupting capacity. *Allis-Chalmers Mfg. Co.*

167—Airless Spray Coolant for precision drilling, tapping, milling, sawing, grinding, generates mist through nozzle by atomizing. No air pressure in 8-oz. plastic reservoir. One valve controls air pressure (50 to 125 psi.); another, coolant flow. *Trico Fuse Mfg. Co.*

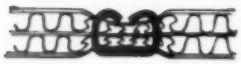


168—Two-Stage Hydraulic Pump delivers from 600 cu. in. per/min. at 100 psi. to 50 cu. in. per/min. at 10,000 psi. Adaptable to shop presses and pullers, high-pressure systems, test-stand installations. Capacity is 2 gal. with 1¼ gal. of usable oil. *Owatonna Tool Co.*

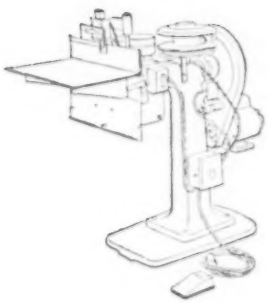
Turn the page

CLOSURE IDEA BULLETIN

For Users of Fibreboard Boxes

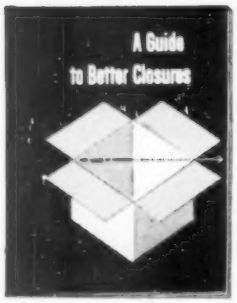


Box components--liners and corrugated media--are all fastened together with the positive clinch provided by wire stitching... clinches all flaps, too...especially important for boxes with wax, lacquer, or other special finishes.



600 full overlap boxes per shift are easily loaded and closed by one man with the HOHT Silverstitcher...can just as easily and effectively close 5-panel folders, and telescope boxes. W1-4 gives full details.

Free booklet, "A Guide To Better Closures" ...an impartial report on glue, tape, staple and wire stitching closure methods ...points the way toward greater savings, superior product protection...send for your free copy today.

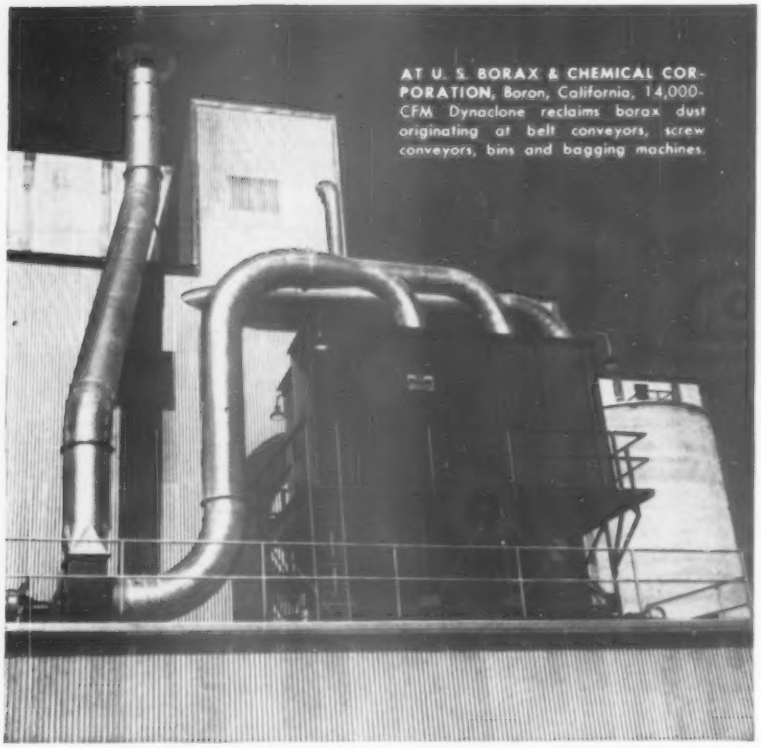


Color comes to wire stitching...increases sales appeal of package. Acme Steel Colorstitch Stitching Wire is chip resistant ...available in a choice of 10 standard colors...normally available in 10 lb. coils...25 and 50 lb. coils available on special order. Colorstitch size available from stock is .103" x .020"...other sizes on order. AD-152 gives complete information.

Your Acme Idea Man is thoroughly trained in fibreboard box closure. His know-how is backed by the 75 years Acme Steel has helped industry solve closure problems. Write Dept. FAW-79, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois, for information on the complete line of Acme Steel box, book and metal stitchers.

ACME STEEL WIRE STITCHING

For more facts Circle 516 on Reader Service Card



AT U. S. BORAX & CHEMICAL CORPORATION, Boron, California, 14,000-CFM Dynaclone reclaims borax dust originating at belt conveyors, screw conveyors, bins and bagging machines.

Constant Suction! Complete Collection!

SLY DYNACLONE®

The Dust Filter for Continuous Processes

Just turn this dust filter on and forget it. The Dynaclone operates continuously, 24 hours a day. It maintains constant, uniform suction at dust sources, reclaims all the dust to prevent air pollution and damage to plant equipment.

The Dynaclone has *new* "Resist-O-Wear" filter bags (patent pending) that give as much as three times longer bag life . . .

It has a new roller cleaner for simplified automatic self-cleaning. Resilient rubber rolls form a positive dust seal as each row of bags is cleaned by atmospheric air drawn in by the main operating fan.

And it contains more cloth per cubic foot of filter than any other make . . . greater filtering capacity with smaller space requirements.

Learn the many reasons why the Dynaclone represents a new high in dust filter efficiency . . .

Send for 36-Page Catalog 104

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OVERSEAS LICENSEE: ANDREW AIR CONDITIONING LTD., LONDON S.W. 1, ENGLAND

For more facts Circle 517 on Reader Service Card

FACTORY / EQUIPMENT NEWS

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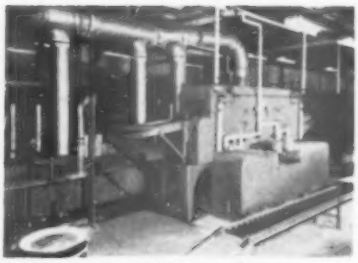
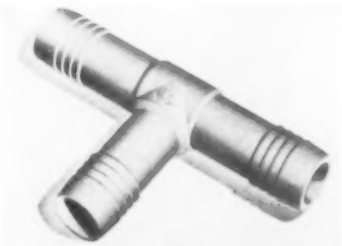


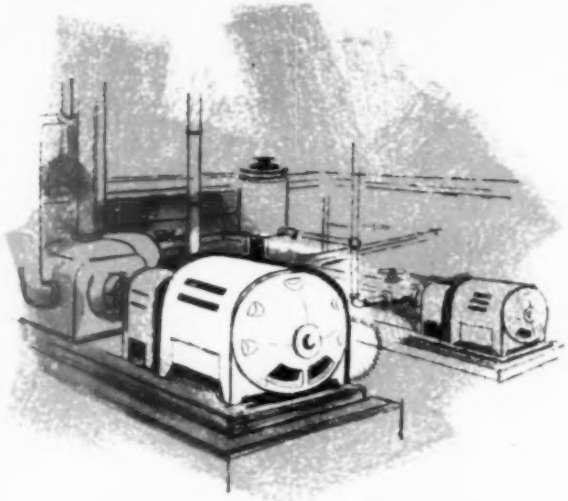
169—Parts-and-Pans Cleaner carries out seven different steps with one operator directing and monitoring. Parts in tote pans are loaded, unloaded, washed. Dry pans return to loading station, are refilled and delivered to proper department. *Frederic B. Stevens, Inc.*

170—D-C Motor is explosion-proof for combustible atmospheres. Features high speeds up to 6000 rpm. and a new ventilating system. Uses more efficient water-to-air heat exchanger, rather than air-to-air type. Ratings from 40 to 150 hp. *General Electric Co.*

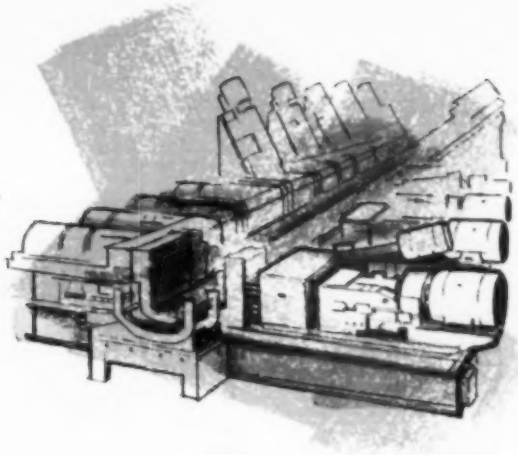
171—"Levetrol Brine System" protects against salt loss due to brine overflow by balancing water level with salt level. Automates your entire water treatment system. Adapts to any wet salt storage installation. Eliminates corroding float valves. *Morton Salt Co.*



172—Plastic Insert Fittings for flexible pipes have high-impact strength to withstand breakage or splintering. Heat-resistant, they maintain shape at temperatures above 300 F. Come in couplings, tees, ells, adapters. Sizes from ½ to 2 in. *Union Malleable Mfg. Co.*



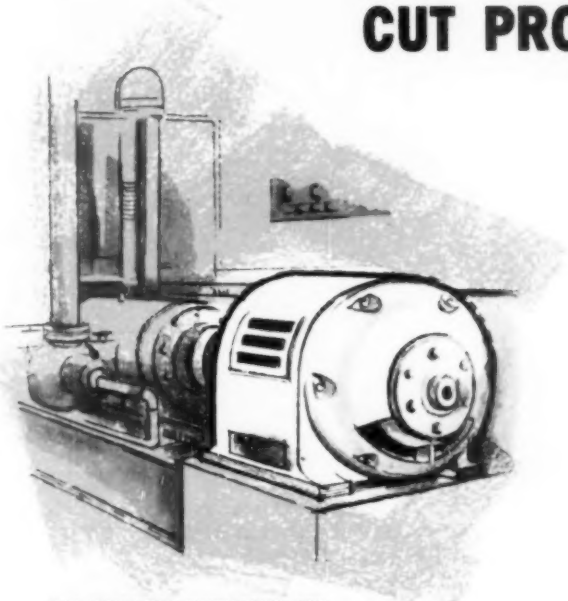
FLUID PROCESSING EQUIPMENT STAYS "ON STREAM"



SILICONE-INSULATED MOTORS KEEP PRODUCTION GOING DESPITE OVERLOADS

HERE'S WHY...

SILICONE INSULATED MOTORS CUT PRODUCTION DOWNTIME



AND ESSENTIAL AUXILIARIES ARE UNAFFECTED BY HIGH AMBIENT TEMPERATURES, MOISTURE, OVERLOADS

Whenever downtime is measured in lost profits, it pays to specify motors insulated with silicones. These motors . . . with extra service factor built in . . . keep production moving even when overloaded as much as 50 percent.

That's because they are designed to let the extra thermal capacity of Dow Corning Silicones carry overloads well above normal rating.

And they operate more efficiently. For example, in one case an exhaust fan requires only 40 horsepower except for the first half-hour of operation when colder, heavier air boosts the load to 60 hp. A silicone insulated 40 hp, 1.50 service factor motor was installed and operates at top efficiency on normal load, handles the half-hour overload with ease.

When you specify service factor motors, there's no need to overmotor for occasional overloads. Excessive power bills resulting from part load inefficiencies are eliminated. What's more, silicone insulated motors withstand high ambients, moisture, some corrosive atmospheres and hazards that cause other motors to fail.

Silicone insulated service factor motors are available from several leading manufacturers . . . and many of the advantages of service factor motors are available from motors that have been rewound with Dow Corning Silicones.

Send for your copy of a new booklet detailing the advantages of silicone insulated equipment.

Specify

DOW CORNING SILICONES

and *Save*

first in silicones

Dow Corning CORPORATION

MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS DETROIT LOS ANGELES NEW YORK WASHINGTON, D. C.

New Super Coilife gives rewound motors extra life

Moisture, acids, alkalis and other contaminants are locked out once and for all with Super Coilife epoxy encapsulation. For full motor protection, Super Coilife can be applied to random wound stators, rotors and armatures. Super Coilife's mirror-like finish will not crack or craze under severe operating conditions.

Because of its unusually low viscosity, this new solventless epoxy completely penetrates the interstices, through the slots, thoroughly coating and protecting the windings. Since 1953, when Westinghouse introduced Coilife* epoxy encapsulation, research, engineering and development have evolved this new and improved product—Super Coilife, an exclusive process.

Only Westinghouse Repair Plants can give the right "thin-wall" thickness for each type and class of winding to give maximum heat transfer away from the windings. Before you send out your next rewind call your Westinghouse representative for the complete story or write for Booklet B-7622: Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

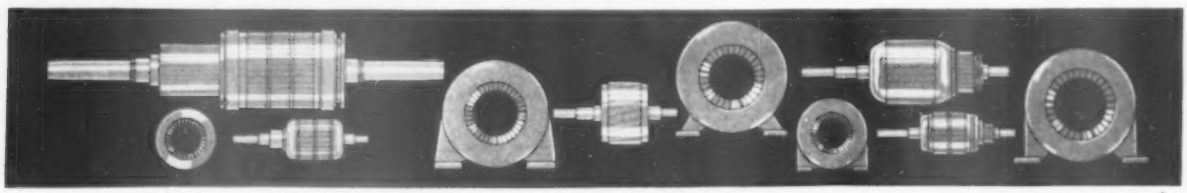
*Trade-Mark J-95197-A

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

USE WESTINGHOUSE MODERN MAINTENANCE SERVICE... SHOP REPAIRS... RENEWAL PARTS... FIELD SERVICE

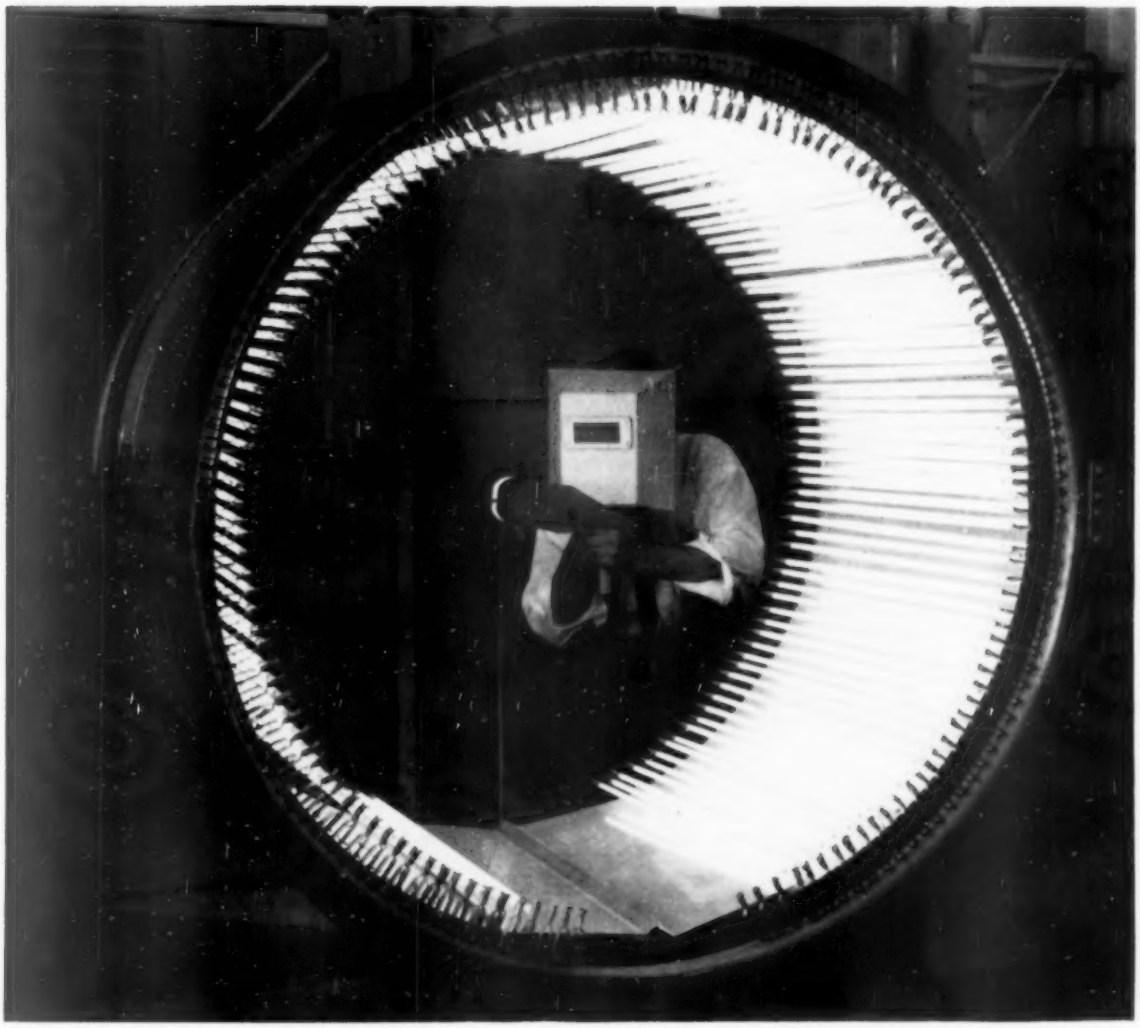


FACTORY

PLANT OPERATING MANAGEMENT

CASE BOOK

WARREN J. KING
Manager, Features and Departments



THIS RADIANT-HEAT OVEN CAN DUPLICATE MISSILE FLIGHT TEMPERATURES OF 3000 F. . . . PAGE 127

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"Supermarket" Storeroom Shines

Your credit is good at the check-out counter of this self-service store. They don't accept cash. But you must show your charge-a-plate. The tab is tallied on an IBM typewriter instead of a cash register. The items, however, don't end up on a food-shelf. They're used in the Bettis plant (Pittsburgh) operated by Westinghouse Electric Corporation for the Atomic Energy Commission.

Here the "supermarket" approach to storeroom parts evolved gradually to eliminate lost time. Self-service shelves invite the "customer"—an authorized requisitioner with a charge-a-plate—to come in and browse around. He enters looking for a replacement part. Free to roam, he often discovers an item on the shelves better suited to his needs.

After selecting the item, he takes it to the clerk at the check-out counter. An item withdrawal form is stamped with his charge-a-plate, thereby transcribing most of the information formerly handwritten. Then an IBM typewriter-tape-punch machine fills in the item's identification number on the form. Simultaneously, it punches a continuous-tape record of transaction.

As far as the "purchaser" is concerned, that's the end of the red tape. He pockets his charge-a-plate till next time and returns to his work station with the required material. The tape, however, goes to the data processing section. There it's converted to punched cards and used to update inventory. This streamlined system saves time all the way down the line. Requisitioner doesn't wait for attendant to get replacement part. Illegible handwritten withdrawal forms no longer have to be tracked down and unscrambled. And hand posting by the accounting department to determine inventory balance is eliminated.

But Westinghouse plans to carry modernization of its storeroom one step further. In the future, when inventory falls below critical "balance point" for any items, machines will automatically punch out a purchase order to replace them.

Converts Control Data Faster

A new tape processing center at North American Aviation (Los Angeles) is setting records in preparing directions for completely automatic, numerically controlled machine tools. The center is capable of converting punched-tape information into magnetic instructions at speeds of four times real time. This is up to 16 times faster than before.

Purpose of the high-speed center —called Numericord Director—is to reduce lead time and costs in the production of military aircraft and missiles. It can produce sufficient tape for over 20 machine tools. Unit was developed by Concord Control, Inc., for the Giddings & Lewis Machine Tool Company.

Space Age Lab Tests Missiles

(Cover Story)

High temperature ovens, super coolers, a six-story high load tester, and a computer named "DAISY" are just a few of the devices used in testing missile, aircraft, and space vehicle components. But all these devices are under one roof at the new Structures Research Laboratory of Convair Division of General Dynamics Corporation, San Diego.

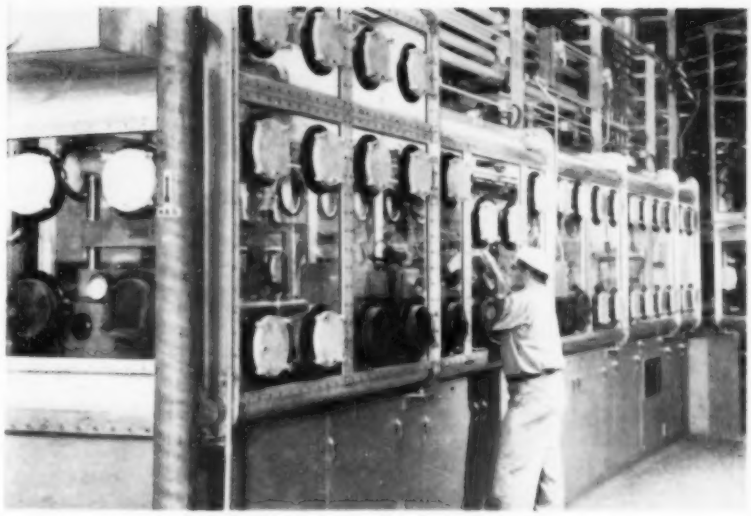
The $2-million facilities will stimulate extreme conditions of heat and cold, and severe physical stresses encountered in space flight. Loads ranging up to 500 tons and temperatures from −300 to +15,000 F. can be reproduced by the equipment.

Electrically heated ovens, tungsten filament clear quartz lamps (cover) plasma jets, and other types of electrical arcs create the high temperatures. At thermometer's other end, liquid carbon dioxide and nitrogen cool components to hundreds of degrees below zero.

Structural tests can be carried out by a variety of mechanical torture devices. A 200 x 100-ft. building six stories tall has steel truss walls and roof so hydraulic cylinders can be attached for applying loads to an entire aircraft. And a water tank 110-ft. long and 20-ft. deep provides adequate room for hydrostatic tests on fuselages.

The giant electronic brain, nicknamed "DAISY" (stands for Data Acquisition and Interpretation System), controls applications of heat and loads. It also automatically collects information from hundreds of thermocouples and strain gages on the test specimen. Readings feed through 80 miles of wire to DAISY and other computers for recording, analysis, and interpretation. The lab is the latest addition to Convair's $12-million Research and Development Center which already houses more conventional equipment—including wind tunnels and acoustical and fuel research facilities.

Reprints of the Plant Operating Case Book are available. Price 50c. For quantity prices write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.



Plutonium Parts Made Under Glass

"Look—but don't touch" is the motto on this production line. The man on the outside looking in (photo) is operating a 10-in. lathe. He's cutting plutonium, about the most unpleasant material you could dream up. Both the metal and its alloys are deadly poisonous, extremely expensive, combustible in air, and can become fissionable if flooded with water. And the material requires special techniques to form, join, or fabricate it.

But tomorrow's nuclear reactors will use lots of plutonium. So the Argonne National Laboratory at Lemont, Ill., recently put into production a new $4,000,000 plutonium fabrication facility. Its purpose is to solve tomorrow's production problems using today's equipment. Here's how it's done.

A 102-ft.-long conveyor enclosed in a 30-in.-wide gas-tight hood runs down the center of the plant. Branching off in a Christmas tree pattern are 10 individual hooded lines and position for two more. Gas-tight sealing doors isolate each branch from the conveyor. Ball-bearing transfer platforms move workpieces as long as 8 feet from conveyor to work stations.

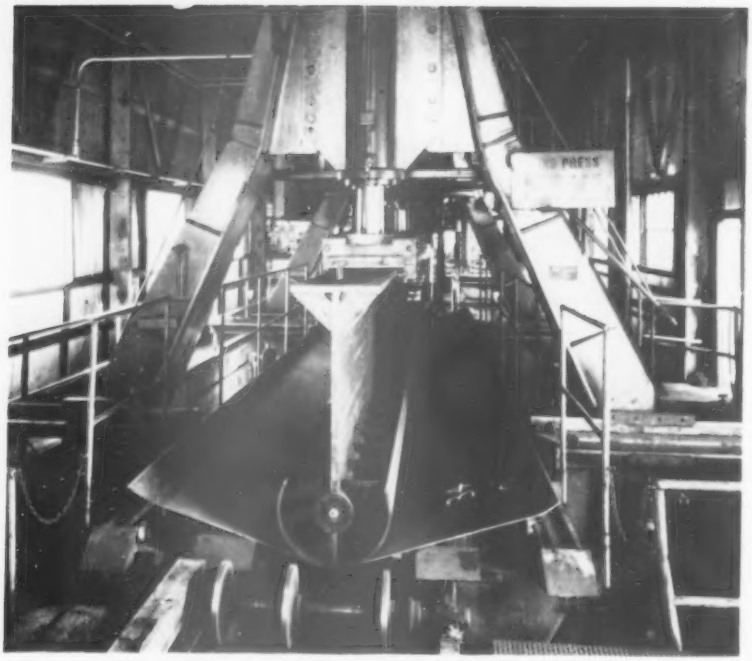
Each line performs a separate operation. Almost every standard metalworking function can be performed on this line or at six other decentralized stations in the laboratory. For instance, besides the toolmakers' lathe, the facility has a 50-ton hydraulic press, vertical milling and boring machine, sheet metal shear, tool grinder, and a milling machine with variable speed drive. In addition, other hooded stations enclose vacuum melting equipment, ingot casting facilities, gas pressure injecting casting machines, extension press, miniature rolling mills, welding equipment, swaging machinery, and a 250-ton powder metalworking press.

Standard equipment modified for tight quarters and limited operator access was used where possible. Material entering or leaving hoods is sealed in plastic bags while air locks at each entry prevent air and moisture from entering. Heat generated in enclosures is removed by circulating water at static pressure below that of hood inert gas.

Helium is recirculated throughout the hoods at rates up to 2000 cfm. A 100-cfm. regenerative purifying system continuously removes contaminants from the helium. If any leakage occurs, the faulty hood is automatically isolated. However, in spite of the modular construction and thousands of feet of lineal joints, helium loss is normally less than 400 cubic feet per week.

Nearly 1600 glovebox openings are mounted along the walls of the production lines. Quickly replaceable neoprene gloves are clamped to the portholes.

All work is carefully scheduled. And complex operations with near critical workpiece shapes are rehearsed before operations start.



PRODUCES PIPE LENGTH PER MINUTE

The downward motion of the male die against converging side beams starts the forming of a giant pipe length at the Napa, Calif., plant of Kaiser Steel Corporation. This U-ing press handles steel plate up to 40 feet long. The circle, up to 36 inches in diameter, is completed by an O-ing press. Then seams are automatically welded by one of the plant's 16 inside and outside electric welding machines. Final diameter shaping is done by a 60-ft. hydraulic expander press that simultaneously sizes and straightens each piece under 5000-psi. water pressure. The new line has succeeded in doubling the plant's manufacturing capacity.

Air Foam Smothers High-Bay Fires

Do you have a high bay, open-floor area packed with expensive machinery and equipment subject to Class B fires (flammable liquids requiring blanketing or smothering agent) and no adequate fire-fighting installation to protect it? Without intermediate firewalls, a fire in such areas is hard to lick because it cannot be sealed off and smothered by an inert gas such as CO_2.

This was the case at Canadian Pacific Airlines' Bristol Britannia hangar at Vancouver International Airport (British Columbia). But the company solved the problem with an air-foam deluge sprinkler system designed by the Automatic Sprinkler Corporation of America.

System has 600 sprinkler heads dotted over 36,000 square feet of hangar area. Can discharge up to 60,000 gpm. of air foam. Then a water spray of 600,000 gallons is discharged through sprinklers when foam supply is exhausted.

Sprinklers start spraying foam blanket automatically throughout entire area when temperature rises faster than it should from weather changes or hangar heating system (rate-of-rise detection).

Fire-smothering effect of the foam blanket is maintained even under supplementary water spray deluge. Once fire is out, foam can be disposed of by flushing it down drains with hoses. It can also be left to dry to powder, then swept away.

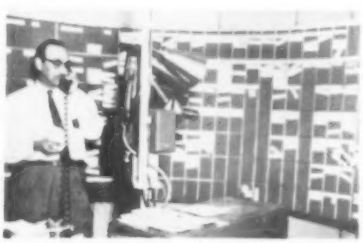
Strips Insulation Faster and Better

The time-honored way to strip cable insulation is simple: Cut it with a pocket knife, and hope for the best. But electricians at Lockheed Aircraft Corporation (Marietta, Ga.) found the pocket-knife method made scrap out of 20% of cable-lengths stripped. This can be expensive business when you're working with fireproof cable for engine harnesses that cost $2.90 per foot. This wire has to be scrapped if one tiny strand is cut as the knife breaks through the last layer of insulation.

To remedy this situation, Lockheed electricians built a special insulation stripper. It does the job twice as fast as the pocket-knife method. And to date there's been no damage to a single strand of tiny core wire. Lockheed figures the cost of the new device—only $9—is recouped several times a day.

Stripping device combines a 1-in. pipe-cutter, normally used for cutting copper pipe, and a 12-volt transformer, with buzzer. Two wires connect transformer to head of cutter and to a steel pin inserted in idle end of the cable.

Pipe cutter revolves around the cable and cuts through the insulation until it gets within $^1/_{64}$-inch of the wire core. Then the circuit is completed and the transformer buzzer sounds. At this point operator removes cutter, tears off remaining insulation by hand.



TV Helps Spot Order Status Fast

Closed-circuit television (photo) speeds production control and order handling at Mansol Ceramics Company (Belleville, N. J.). A special room built in the center of the plant

is the nerve center of the new system. It's equipped with a TV camera and a circular pin-up board. Control and monitoring facilities are in the office area.

When a customer calls in regarding his order, the desired production information can be flashed on the monitor immediately. There are no lengthy delays while the order is tracked down. This saves wear and tear on everyone's nerves.

By building the pin-up board in circular fashion, Mansol gets a fixed focal length for its TV camera in all directions. On the board job tickets indicating the status of each project are kept up to date. As a job moves from one process to another the appropriate entry is made on the big board.

NEW ROOM BRIGHTENS LIFE FOR RETIREES

This cheerful room is for retired employees of Eastman Kodak Company (Rochester, N.Y.). It's equipped for movies and slides and contains a television set, record player, and radio. Features twice-weekly card parties as part of the program for retirees. Average attendance at these functions runs over 100. The facilities are open between 8 a.m. and 11 p.m. every working day.

The room is painted in bright colors, has a Grandma Moses original on one wall, ceiling-to-floor windows, and handsome white draperies. It replaces a smaller room in an older section of Kodak's recreation area.

Cost Cut Doubled

For the second time in three years methods engineers at Westinghouse Electric's appliance division (Columbus, Ohio) have cut 14% off the cost of refrigerator-door gaskets. The first 14% cut three years ago came from a decision to make gaskets instead of buying them. The second 14% comes from improved packing, handling, and fabricating.

Latest cost cut calls for shipping 95 strips flat in aluminum trays. For shipment, a nest of 12 trays, each measuring 26x200x2¼ inches, is packed together and mounted on a four-caster dolly. This way, trays roll up to the production area. When empty, 24 trays, 2 tops, and 2 dollies are packed together and returned to the supplier for refill. Gasketing strips vary from 98 to 194 inches long.

Trays cost about $35 each; dollies, $60. But Westinghouse industrial engineers figure that 43% of this investment could be recouped in salvage if it should ever be decided to scrap the method.

Until three years ago an outside supplier fabricated finished door gaskets and shipped them in "refrigerator-shaped" cartons. Then Westinghouse began buying gasketing material and making its own. Straight strips were coiled in cartons on arrival at the plant (FACTORY, October 1955, page 141).

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

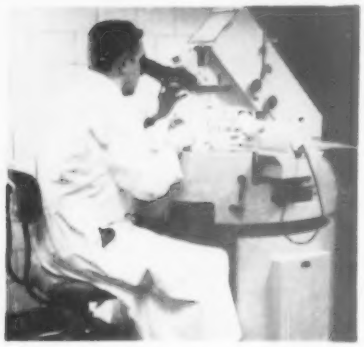
Mixers Fit All

Flexibility is the key at these mixing stations in Sinclair and Valentine Company's efficient new ink plant (Secaucus, N. J.). Here counterweighted mixers float up and down at the operator's touch.

This solves the problem of using

a variety of shapes and sizes of drums for mixing inks. A wall-mounted angle-iron frame supports each mixer. When in use, mixers are secured with a clamping bolt. The room has seven mixers.

In addition to the counterbalanced mixers, this area incorporates several other interesting ideas. The operating floor is several inches below floors in adjacent areas, to confine spillage of hazardous liquids. With concrete ramps at doorways, trucks move in or out easily. To simplify maintenance a steel plate has been placed behind each mixing station to prevent ink splashes from getting on the concrete block wall. As for safety, electrical grounding clamps are handy to each mixer. Inside the mixing area, barrels ride on dollies with locking wheels. Abbott Merkt & Company, New York City, designed the plant.



New Microscope Checks Gages

Speed and accuracy are the important considerations at Timken Roller Bearing Company (Canton, Ohio). That's why the company has installed a new Zeiss microscope to check tool profile gages needed for grinding the forming tools used on automatic screw machines.

The new microscope can check a tool profile gage with as many as 15 measurements and 8 angles in just 15 minutes. Does it to an accuracy of one-ten thousandth of an inch and angles to one minute.

Fine adjustment knobs (on either side of binocular viewer) plus push-buttons that change the various calibrated scales (under operator's left hand) make for fast adjustment to meet any inspection need.

No-Hands Feed

No hands needed on this saw to get the work done. Sawing tubing on seats is completed quickly and precisely at Heywood-Wakefield Company (Gardner, Mass.) with the help of a hydraulic cylinder-feed hooked to this delta radial saw (photo). The 4-in. feed automatically guides the saw's cutting blade in and out. Operator just steps on pedal to actuate the feed. This leaves his hands free to position pieces in cutting jig at proper angle. After the cut, radial saw returns to its normal position automatically.

Plant Services in Right Place

Building a missile bomber weighing 450,000 pounds causes production problems never before encountered. Boeing Airplane Company found this out at its Wichita (Kan.) plant. It met these problems head-on in the building of 80-ft. wing sections, in which every rivet head, joining point, and bolt has to have an air-tight seal so the wing can hold fuel.

Problem was to get services to production workers inside the wing while possible leaks were tested and sealed with a quick-cure sealant before the wing was joined to the fuselage. Naturally, in this confined area temperatures, atmosphere, and humidity were uncomfortable, perhaps dangerous, for workers.

So Boeing built an underground maze of piping and ducting tunnels to bring services directly into the wing sections. Through this approach Boeing plant engineers were able to do the following:

- Air-condition the interior of the wings so crews can apply sealant with maximum speed and greatest safety.
- Provide enough fresh air to eliminate toxic and explosive fumes from cleaning agents and ammonia used in testing.
- Supply fresh water to clean off wing interiors after leak tests.
- Control humidity and heating of individual sections for best curing conditions for the plastic sealant. This means temperatures up to 140 F., humidity to 100%.

The sealing and curing operations are carried out in a 27,000-sq.-ft. area interlaced with an underground tunnel system. The area can accommodate 10 major wing sections at any time. Each wing has its own service control center.

Tees Tell Where

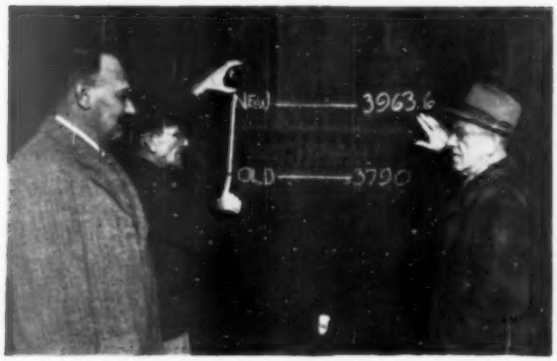
This attractive pegboard is all that's needed at General Railway Signal Company to tell who is where. Each man in the methods and estimating section has three golf tees of a distinctive color numbered in sequence. When he's heading out—say to time study and then to the electrical lab—he simply plugs his No. 1 and No. 2 tees into the proper holes.

This way others can tell where each member of the department is if he's needed. The board itself is a scrap piece of ½-in. fir plywood. Was transformed in a home workshop. Estimated cost of materials: 40¢. Labor: about three hours.

Source: R. M. Weir, Process Engineer, General Railway Signal Company, Rochester, N. Y.

1. FOUR-ON-ONE SAVES CONVEYOR SPACE.

2. THERMOS PLUG STOPS STEEL WASTE.



3. RECHECK DISCOVERS UNKNOWN GIVE-AWAY.

4. PIN PROVIDES FOR SAFETY FIRST.

Employee Suggestions Hit the Jackpot Hard

These four examples of employee alertness in the plant have paid off handsomely for Ford Motor Company, Dearborn, Mich. They save conveyor space, cut molten steel and tar losses, and reduce the accident hazards in handling work rolls on the hot strip mill. In each instance, the worker who came up with the cost-saving idea or suggestion got rewards. And Ford was able to chop costs. Here are some brief details on the ideas and their results:

1. Conserving conveyor space—Here's where a housewife's experience in saving clothes-hanger space paid off. Benefits came when she transferred it to the Thunderbird paint conveyor line.

Formerly four small instrument panel parts came down the line on individual hooks. The redesigned hanger (photo, upper left) saves space and makes it possible to hang the four parts on the main panel hook. For her trouble the gal received $1736.

2. Cutting molten steel waste—An ordinary thermos-bottle type of stopper saves tons of liquid steel at Ford's Steel Division (photo, upper right). Before two supervisors thought up this idea as much as 50 tons of steel escaped through the pouring nozzle of 200-ton open hearth ladles every two months or so.

The seepage occurred after melting and before pouring into ingot molds, despite sand stuffed into nozzle and stopper rod in its top. But the new plug put a stop to this. It's similar to the plug in any thermos—but holds sand in the 2-in. nozzle hole instead of coffee.

3. Saving gallons of tar—At the coke ovens byproduct operation Ford sells tar off by the tank-inch (photo, lower left). The former conversion figure per inch of tar was 3790 gallons. But a sharp-eyed worker compared the calibrations on the million-gallon tank and the markings on a ship receiving tar from the tank. They didn't match. The company then checked its calibrations, discovered that for every level inch it sold, it was doling out 173 excess gallons—free. The new calculations showed a level inch contains 3963.6 gallons of tar, not 3790. To the sharp-eyed operator went an award of $3000.

4. Boosting safety—The two rolling mill workers divided a $600 award for suggesting a safer method of changing 6-ton work rolls on the hot strip mill (photo, lower right). Their idea: Insert a pin in the roll's neck to prevent it from slipping out of the changer.

Before the new safety pin idea, rolls were held in the 14-ton changer by balance alone. If balance were lost, they'd slip out. Pin idea now works on both roughing changer (handling 20 rolls per week) and finishing changer (handling 400 rolls per week). Result: There's far less danger of one of the king-size rolls thumping to the floor. Or even crashing through it.

CUTS COOLING LOAD BY KEEPING SUN'S RAYS OUT

Eighty-one automatically operated aluminum louvers make life pleasanter for office workers at the new plant of Gordon Foods in Atlanta. With sun rays diverted, the air conditioning load is reduced. And so is the glare in the office area. Louvers are open at a 90-deg. angle till noon. Then they close in four hourly adjustments. They reopen between 5 and 7 p.m. in three steps. The control mechanism for the 161-ft.-long installation is adjusted twice yearly. Four ½-hp. synchronous motors located on the frames of the aluminum louvers supply power for moving the panels. Panels are 27 inches wide and 24½ feet high.

New Power Ideas Spark New Mill

All main mill motors at Lukens Steel Company's new 140-in. slabbing mill are right out on the mill floor. But the twin 5000-hp. horizontal roll motors and the 3000-hp. vertical roll motor are integrally ventilated and cooled with filtered air under above-atmospheric pressure. This eliminates the traditional dust-free motor room.

But this is just one of several new ideas built into this efficient mill at Coatesville (Pa.). Another example is the supporting of the main mill drives by two 8000-kw. "back-to-back" connected rectifiers. This is only the second big mill drive in the world to eliminate motor-generator sets that require twice the space of mill motors themselves. Rectifiers are 10% more efficient at full load, require little space and no foundations, offer faster and more precise control, have far less downtime.

Here are some other features in this new Lukens plant:

- Air clutches provide screw-down drives which do not rely on electric power for normal operation.
- Vertical rolls are top-driven so scale and dirt do not fall into the mechanism.
- Control and auxiliary equipment are in a multi-level cellar under the mill. Cellar openings are protected by raised concrete walls.
- Automatic programing controls all rolls, so operator doesn't have to touch even a single knob or lever once the ingot is on the entry table. But at any point in the sequence the operator can easily switch over to manual control.

New Division, New Techniques

Diversification can bring about real changes in management thinking. Take Northrup Aircraft Corporation, for example. Late in 1957 it set up a new division at Hawthorne, Calif. Its name: Nortronics. Its work: electronics.

In splitting away from the aircraft industry the new unit began using new methods to meet its own problems, unique to the electronics field. Changes in general layout and production planning alone created different problems in the management of materials.

In the airframe industry, the prime contractor does most of his work in a huge, single operating location. Purchased subassemblies go directly to line for point-of-use storage. Most purchased parts are finished and ready for assembly.

But in electronics there's a mass of purchased and fabricated raw, semi-finished, and finished parts. Thus material control and purchasing problems multiply while interdependence among purchasing, material control, and production increases. (At Nortronics, purchasing and material control are integrated under the material department.)

The new problems called for new solutions, maybe even some drastic ones. So the company set up a four-man committee of the busiest material and production supervisors. The committee's instructions: Spend one full day every week at work in committee meeting.

Purpose of the committee's job is to figure out a better way to coordinate its functions. Members include the manager of material operations (responsible for ordering, storing, disbursing, and keeping records on all purchased materials), the supervisor of production planning, the general foreman in charge of assembly and testing, and the general supervisor of manufacturing project control. This last man is responsible for stockrooms, expediting, scheduling, production ordering, fabricating control, tool control.

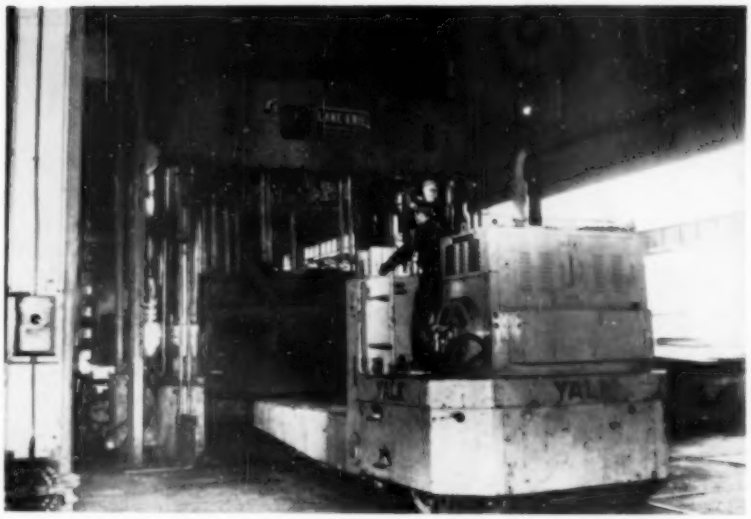
What's the result of the committee's action to date? Here are three schemes the group has hatched:

1. Material department assumes responsibility for a new in-plant purchased-materials stockroom. Ob-

jective is to cut material handling costs, paperwork, and number of shortage problems. To do this, the purchasing stockroom, some miles from the plant, was consolidated with the production storeroom. Then the single unit was put under the material department in more convenient quarters. Production is still responsible for work in process.

2. An assembly parts list is enough to keep track of materials in the airframe business. But not in electronics work. So a central parts list, including raw and semi-finished materials, replaced the assembly parts list. The new list is complete enough to serve as a bill of material for any product. It's multilithed to serve as a disbursement document, too.

3. Production planning does all work on engineering drawings previously shared with material department. The committee decided to centralize this work to avoid duplication of effort.



INSTALLS GIANT DIES IN HALF THE TIME

There's no more piecemeal moving of big dies to presses at the American Car & Foundry plant in Milton, Pa. A 200,000-lb.-capacity platform lift truck (Yale & Towne Manufacturing Company, Philadelphia) carries fully assembled dies to presses in half the time. In photo above, truck helps to install 130,000-lb. circular die for forming 10½-ft. tank ends. Truck picks up die from storage, moves it onto 4000-ton press. Formerly individual die parts were separately handled by bridge crane and track-mounted flat car. Then die was assembled on a car beside press. ACF devised new handling method to achieve greater production flexibility.

Keeps Tabs on Bars

They're speeding up machine loading by—of all things—using one of their own products at Pyle-National Company (Chicago). The product is miniature indicator lights. Installing them on each of 10 automatic screw machines speeds control of bar-stock supply.

Now production foremen and set-up men can tell at a glance how the bar-stock level stands. A green light, mounted on a vertical shaft above each machine (left in photo), indicates the machine is operating. On the other hand, a red light flashes when the bar stock is low. Thus there's no need to send a man around periodically to check.

Right Conditions Cut Spoilage

A combination preheater and tank humidifier at Grant Photo Products, Inc. (Lakewood, Ohio), insures just-right temperature and humidity in a photographic-material winding chamber. Through sensitive controls the arrangement changes or maintains precise conditions at a moment's notice. Relative humidities vary from 55 to 99%, and temperatures from 80 to 120 F.

These wide ranges are necessary because various materials react differently to given air conditions. The photographic materials range from extremely hard acetates to very soft paper. If the air is too moist, a particular material may become limp and tear. If the air is too dry, static electricity may ruin the material, as well as create a fire hazard.

Now here's how the unit controls conditions so closely: Air at the rate of 1500 cfm. is sucked from the winding chamber into the preheater. Here a self-operating regulator (Powers Regulator Company, Skokie, Ill.), located on the 20-psi. steam line supplying the preheater, maintains the air passing to the humidifier tank at a constant temperature. The regulator's thermal bulb is inside the tank immediately below the preheater. As air passes through the tank it picks up moisture from evaporating water in the bottom of the tank and from a mist created by 100 mist nozzles on eight vertical pipes within the tank.

Meanwhile another self-operating regulator is located on the steam line supplying the heating coils at the bottom of the tank. It maintains the tank water at a constant temperature. Moist air passes through the exhaust duct and into the conditioning chamber. Tests showed what combination of adjustments on the two regulators would produce a given air condition in the chamber. These were then charted for the chamber operator.

Freshly coated and dried material enters the 25-ft.-long winding chamber on chain-driven wooden racks. Although the opening is 48 inches wide and 6 feet high, the material draped over the racks acts as an entrance curtain. Thus leakage of recirculating air is negligible.

YOU BE THE ARBITRATOR

THE CASE OF

The Unwanted Clean-Up

Out of the experience of the American Arbitration Association

The foreman of a foundry asked two cupola tenders to do certain clean-up work. The men refused. Claimed it was not within their job classification. The argument went on for a half-hour, with no work of any kind being done. Finally the foreman said: "Either you do the work as I direct and file a grievance about it later, or you go home." The men went home.

When they reported for work the next day, they found they had been given three-day suspensions for refusing to obey the foreman's orders. "We didn't disobey the foreman," they argued. "He gave us a choice of doing the work or going home. We elected to go home. He didn't warn us we were subject to discipline if we did."

"The foreman didn't have to warn you," answered the personnel manager. "You knew you were supposed to work as directed and not go home. You chose to risk discipline and now you've got it."

Eventually the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 140

Large Grinder Chews Up Secrets

This garbage disposer is efficient enough to take care of a city of 25,000. But it's not for home garbage disposal. It grinds up classified papers, blueprints, orders, technical bulletins at Convair's (Division of General Dynamics) San Diego plant. The law says all such paper must be completely destroyed for security.

Convair used to burn these papers. But now the "hot" paper is digested into a moist mass of pulp in the grinding vat (right). At bottom of the vat a plate revolves on a shaft. Two knives attached to the plate create an egg-beater effect. They impel the paper through an opening at the bottom of the vat, where three screws pick it up and feed it into the chute. This transfer resembles the way coal travels along an automatic stoker.

Machine cost $7000. Can chew up 2000 pounds of newsprint an hour or 200 pounds of heavier blueprints. Convair uses the machine 20 hours a week. Figures it's saving 16 man-hours per week over the old incinerator method. Another benefit: By chewing instead of burning its papers, Convair is helping its air pollution effort.

Nine Ways to Cut Dust Hazards

Is that dusty operation in your plant an explosion hazard? Well, all's not lost! Here are nine tips from the Factory Insurance Association (Hartford, Conn.) to help you avoid losses or prevent destruction of your plant:

1. Post written safe-operating instructions and enforce them.

2. Limit the size or volume of apparatus in which dust and air mixtures cannot be avoided, such as pulverizers, pneumatic conveyor tubing and receivers, and bins or tanks. If you can, design this apparatus so it is able to withstand maximum explosion pressure. Or equip it with rupture diaphragms or explosion panels piped to the atmosphere, so explosive forces may be relieved with minimum damage.

3. Make equipment dust-tight to prevent the accumulation of dust in operating areas. This reduces the likelihood of a secondary explosion. Maintaining a slight negative pressure in such equipment greatly reduces dust emission.

4. Balance internal pressures (and vent dust-laden equipment) so dust clouds will not be set up.

5. Provide adequate pneumatic dust pick-up and disposal systems wherever dust is emitted, such as belt conveyor trips, bucket elevator chutes, and bagging stations. If you need it, install a fixed-pipe vacuum cleaning system.

6. Install electrical equipment in accordance with the National Electrical Code for Hazardous Locations to eliminate sources of ignition. Thoroughly ground such equipment against static accumulation and discharges. Interlock magnetic separators with conveying equipment to remove any tramp metal that might produce a spark.

7. Utilize light building construction where possible. Provide explosion relief, such as explosion-type window sashes, panels, or hatches in the walls or roofs of buildings. One inexpensive way to do this: Use roofing paper to make explosion-venting panels.

8. Flood dust-producing and handling equipment with an inert gas, such as nitrogen or carbon dioxide.

9. Consider installing explosion-suppressing devices.

Makes Inventory a Snap

Work-in-process inventory keeps better track of fabrics during production at the Van Raalte Company plant at North Tonawanda, N. Y. But it produces a by-product benefit, too. The system simplifies semi-annual physical inventories, makes a one-day job out of an operation that used to require two weeks.

Key to the in-process inventory system is a four-part knitter's ticket. It's one of three basic forms used for the in-process inventory plan. The other forms are inventory control and pattern summary tickets. All are on standard Keysort cards (Royal McBee Corporation). Thus, when the cards are properly notched, they lend themselves to easy sorting and grouping.

The plan provides weekly management reports on each stock item in various stages of production. The notched portion of each card tells exactly where each particular item is. This helps to reduce inventory losses and eliminates office and production snarls.

The knitter's ticket accompanies work through processing. It has a different color border on each section for easy identification, and the first three sections have carbon-paper backs to simplify posting. At each stage workers post pertinent production information. At final inspection, weighing, and storage, the first two copies of the ticket are separated and sent to the office while the last two remain with the stored fabrics. In the office a clerk joins the two tickets to the corresponding inventory control card. Keysorting facilitates this matching. And the fact that each inventory control card has a matching knitter's ticket provides a built-in inventory check (photo).

The third and fourth copies of the knitter's ticket remain with the goods until physical inventory is taken semi-annually. Then one copy is removed by a stock checker as his partner counts the number of pieces of cloth on hand. When the ticket and piece-count check, tickets go to the area superintendent. He rechecks the total, then forwards tickets to the office.

In the office a clerk matches the inventory section of the knitter's ticket with the inventory control card. This shows stock is on hand. Absence of a ticket indicates a shortage, starts an investigation. In the final step a clerk posts quantity, pattern, and number of tickets on a summary inventory card. The fourth copy of the ticket remains with the merchandise to identify it.

Formerly physical counting and hand recording took 300 to 500 man-hours. And many errors were made in transcribing data. There was also a two-week delay before final inventory figures were available. This preparation now takes two days.

CASE BOOK CAPSULES

Supersensitive heat-treating furnace automatically carburizes 700 pounds of parts per hour at White Motor Company, Cleveland. Precise dewpoint and heat control through five zones assures uniform high quality.

Data-processing system provides high-speed inventory control of missiles and conventional weapons for U. S. Navy's Bureau of Ordnance. Leased from RCA, system tallies parts from start of production until used.

Wanted by General Electric Company (Schenectady): oldest G-E general-purpose dry-type transformer in operation. If you have it, you're a winner. Prize: brand-new G-E QHT transformer of comparable rating; value: $500 to $1500.

TV "pencil" camera slips into 3-in. diameter reactor tubes to detect welding flaws without pulling tubes from pile. Built by Diamond Power Specialty Corporation (Lancaster, O.), monitor and power unit ride to inspection sites on cart.

Fluorescent lamp developed by Westinghouse Electric Corporation (Pittsburgh) ignites without starter or external ballast. Built-in incandescent filament eliminates need for ballast.

Electronic computers simplify English translations of Russian technical literature for the Army Office of Ordnance Research. Machine unscrambles translated words into meaningful sentences.

First soda ash recovery installation to fight pollution in the pulp and paper industry is at Consolidated Water Power & Paper Company (Wisconsin Rapids, Wis.). Prevents discharge of collectible liquor into Wisconsin River.

Flying saucers, suspended in the stratosphere by high-frequency radio waves, are feasible, says Raytheon Company (Waltham, Mass.). While aloft for long periods of time, these stations would aid defense and scientific purposes.

TV SPEEDS QUALITY DATA FROM LAB TO PRODUCTION FLOOR

Speed of getting quality control test information to production reaches an all-time high at Eastman Kodak, Rochester, N. Y. It's done with a closed-circuit television and pneumatic tube system between the testing laboratory and paper mill some 900 feet away. Raw paper samples arrive from testing from paper mill via the pneumatic tube. After the required tests, a lab technician (left) records test results on data cards.

Each card (mounted on a sliding 2-ft.-wide, 14-ft.-long rack) corresponds to a papermaking machine at the mill. Operators at either the mill (right) or the lab can bring appropriate cards into view of a ceiling-hung, stationary TV camera by pressing electrical control buttons. To further facilitate exchange of information, a Teletalk system links sending and receiving stations. The old method took up to 32 hours to compile and carry data from point to point. Now complete test results follow production by little more than two hours.

Gets Test Unit Out of the Way

Mounting critical vibration test equipment high overhead serves a dual purpose during air-conditioner inspection at the Coolerator Division of McGraw-Edison Company (Albion, Mich.). First it gets the fragile test equipment out of the way. Second it isolates it from other vibration influences.

The test equipment, specially designed by Coolerator, checks vibration in fan motor and compressor of all room air-conditioning units before they leave the plant. Special heavy-duty tubes are an important part of the $2000 unit.

The instrument measures lateral amplitude of vibration by means of an electrical probe (photo). If it's greater than four mils, a bell rings and the operator rejects the conditioner. A built-in electrical capacitance within the probe fluctuates whenever vibration is above the tolerable limit. The effect is amplified and a contact is closed to set off the bell.

Testing is done on a separate section of the conveyor. This isolates each unit from other units operating nearby. Thus all extraneous vibrations that might set off the delicate inspection mechanism inadvertently are eliminated during each 45-minute test.

Employees Ease Into Retirement

Latest plan to ease the shock of retirement comes from the retail, wholesale, and department stores in New York. There, managements are sold on a union plan for trial retirements. Developer of the plan is Local 65, Retail, Wholesale and Department Stores Union, AFL-CIO. The plan works like this:

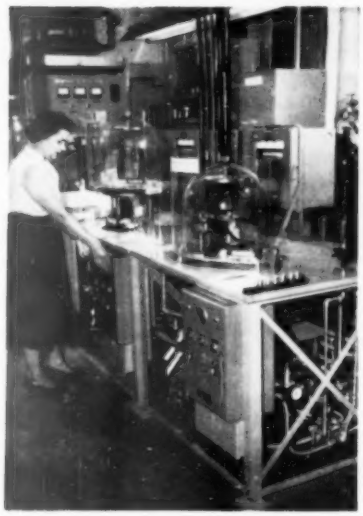
Any worker eligible for retirement may take a leave of absence for six months to a year. During this time he draws retirement benefits as though he were retired. And he has full status as a retiree in the union's deluxe retirement club. At the end of his leave he can return to work or make his retirement permanent. It's his choice. If he does return to work, he may later apply for another leave of absence to try retirement again. Of course, he's expected to work a reasonable period of time if a short re-employment works a hardship on the company.

From the retiree's standpoint, the trial retirement has plenty of advantages. He finds out if he can live on his retirement income. He also has a chance to find out how he'll adjust to leisure. Most important, the day of retirement doesn't have the finality it does in most plans. This minimizes the shock of retirement that colors attitudes from retirement day on.

The trial retirement plan has advantages from the employer's standpoint, too. Workers who have reached age 60 and feel they don't want to work any more can test out

retirement rather than hang onto their jobs through fear of the unknown. And those who return to work after their leave of absence know definitely that they want to work, thus do better jobs.

Only eight members of Local 65 have been eligible to try the trial retirement plan to date. Three have retired completely. Three more have returned to work after a trial retirement. Two haven't tried the plan.



Brazed Under Glass

A dome descends, a high-frequency heater starts up, and subminiature gyro parts get a superfast brazing and soldering under glass. This reduces by 90% the time formerly required to braze and solder Sparrow III missile components at Raytheon Manufacturing Company, Lowell, Mass.

It's all part of the automatic brazing and soldering facilities developed by Raytheon. Process cuts out wasted time and inaccuracies encountered with a soldering iron, a torch or manually controlled induction heating methods.

Parts rejection is practically eliminated. Close tolerances are possible. Temperature is controlled within a range of 90 to 3000 F. Once the dome is in position, all operations such as time, heat, gas, and purge are controlled electronically. The induction heaters (General Electric) have variable impedance output that can be matched to load rather than *vice versa*.

Updating Your Medical Program

Thinking of improving your plant medical department? If so, here's a six-part plan to guide you. It's suggested by Dr. D. H. Robinson, assistant medical director of the Standard Oil Company (California), with headquarters in San Francisco. It's designed to help any manager who has to set up or supervise a medical department. Principles are the same as in any other management job, but details differ.

1. Plan adequately and employ capable personnel—Sit down with experts and exchange ideas. Simply engaging a local doctor for emergencies or hiring a registered nurse isn't the way you'd plan a change in your auditing system. Nor is it good enough for a health program.

Planning means visiting plants with good medical programs, interviewing several doctors and picking the physician who will give you the best service for his salary—even on a once-a-week schedule. And it's important to make your plant look like a good place to work. In picking a nurse, let a physician help you—also the local medical and nursing society.

2. Delegate responsibility and authority—If your plant warrants a full-time physician, make him responsible for the occupational health program. The size of your plant will suggest whom your physician should report to. Spell out the lines of authority clearly.

You may want a physician with a degree in medical administration to head your program. Such doctors are rare. But the physician who heads your program must be interested in management—from your viewpoint and that of his department. If he isn't, he's not your man.

Good medical management may require some training. So your doctor must be a willing and apt pupil. Industrial medicine makes a physician study and apply the principles of personnel administration. He must be able to discuss mutual problems—giving some, demanding some—as any good manager should.

If your plant is too small (under 2000 employees) for a full-time physician, your full-time nurse should be the supervisor. She will know when and how to get the most help from the doctor who calls at regular periods. A part-time physician should supervise medical and professional work only.

If yours is a very small plant that needs only a part-time nurse and physician, you can contract with a physician or group of physicians who specialize in industrial health and have other contracts. This will provide an easy-to-supervise part-time program.

3. Keep an eye on the product—Your people's health, that is. You don't have to be a physician or a nurse to tell if your program is up to standard. These are some symptoms of a good program:

Employees go to your nurse to talk over their health problems and get counseling.

Several employees praise your physical examinations and the chance to talk to the doctor.

The dispensary is clean, orderly, and well-equipped.

You sense that health education is filtering through your plant and you are asked to help with posters, movies, meetings.

Doctor and nurse suggest safer methods and hygiene, then heckle you (politely) until you act.

Health personnel are available when they're supposed to be.

4. Keep an eye on the balance sheet—The first year or so your program may run in the red. But after that it should save money. It will do this by:

- Reducing absenteeism.
- Cutting accident insurance costs.
- Decreasing the cost of payments for illness.
- Making workers more productive through more on-the-job time.
- Minimizing time lost per accident by giving the best care.

The list of benefits is by no means exhausted. For every 250 men you employ, you should show about $15,000 profit from your program—not counting hidden and immeasurable benefits. If you're not getting these profits, something is wrong—maybe supervision. A profitless program is not justified.

5. Communicate both ways over definite channels—Your doctor and nurse must visit in the plant regularly. At the start there should be exhaustive tours, with professional personnel introduced to all your

methods and workforce. Anything less than this will get communications off to a poor start.

Planning meetings and getting a meeting of minds must go on regularly. An important part of your program is the regular visit of the physician and/or nurse to see new processes, new supervisors, or old processes in a new light. You and other members of management must talk regularly of your problems and aims to your medical staff.

Your medical people are responsible for knowing plant and processes. So be sure no new process slips in unknown to the health people. Let them help you avoid health problems. But be sure that communications work both ways.

Cool. Man. Cool

This fellow is sitting in a "hot box" without a sign of discomfort. And no wonder! That's a 10-ton air conditioning unit at his side. It keeps the room regulated to a comfortable temperature.

Our man is operating a blooming mill at Ford Motor Company's steel division in Dearborn, Mich. Beneath his pulpit pass red-hot ingots on their way to reducing rolls, the first step to making sheet steel. While one ingot is being reduced in front of the pulpit, another is in "ready" position in back. Thus the compartment is exposed to extreme heat from two directions. And windows to the front and rear of the compartment further magnify heat intensity. Despite this bombardment, the air conditioner (American Standard) is able to keep the operator cool and comfortable.

Puts Electricity Where It's Needed

There's flexibility on the production floor at Product Design Manufacturing Company, Newington, Conn. Continuous multi-outlet electrical strips provide power for bench as well as floor equipment. This way, layout engineers can move equipment where it's needed without using long extension cords.

An example of one way product design uses Plugmold is shown in the above photo. It's mounted on the reverse side of a workbench partition behind a battery of drill-presses. One strip has outlets on 30-in. centers, the other on 5-ft. centers. This is enough for immediate and future needs. But, if necessary, outlets can be added by replacing existing cover sections with new ones carrying more. Furthermore, the entire Plugmold system (Wiremold Company) can be easily demounted and installed elsewhere.

Just-Right Moisture

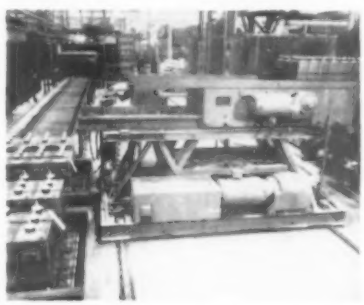
Here's a space-age answer to the ancient problem of maintaining proper moisture content in sand molds. General Motors' Central Foundry Division (Danville, Ill.) uses Plutonium-239 to do the job. It's said to be the first industrial application of its kind.

Here's what goes on. Fast neutrons emitted from 32 grams of plutonium (mixed with beryllium powder and sealed in a steel capsule) collide with hydrogen nuclei in the water atoms of the moist sand. Slow neutrons born of the reaction can be counted electronically. And their number is directly proportional to amount of moisture in the sand.

Says Division General Manager James Smith: "This new method of gaging sand moisture has substantially improved our ability to make sand molds of uniformly high quality. It does this by permitting us to maintain a more exact moisture content than ever before."

Excessive moisture reduces molding strength and permeability. Good molds must have sufficient strength to prevent mold material from being washed into the mold cavity by the molten metal. But they must also be permeable enough so steam and other gases can escape as metals cool and solidify.

In the old days an operator made a simple hand test, gave the go-ahead when the sand felt right to him. There's no more of this guessing with the new system. Accuracy of the new sand moisture gaging method is better than plus or minus 0.05% by weight over a range of 2.5 to 5.0% total moisture content.



Moves Four Ways

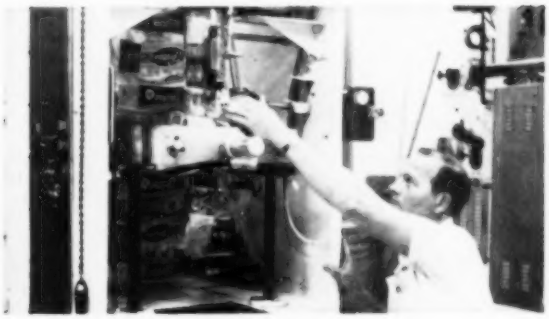
This semi-automatic pallet transporter helps Westinghouse Electric Corporation process capacitors efficiently at its new plant in Bloomington, Ind. Operated by one man riding in a control pulpit, the unit moves capacitors from the conveyor at left to three banks of vacuum ovens and impregnators at right.

Transporter (Special Products Division of The Colson Corporation) moves in four directions: traverse, lift, side shift, roll-on-roll-off. It rides on floor tracks, has a 12,000-lb. capacity, with a lift capacity of 3000 lb. Lift speed is 3 fpm; traverse speed, 31 fpm. Control is hydraulic or electric.

Capacitors arrive banded together on steel pallets. While one pallet load is being processed, the transporter loads or unloads another.

1. MAN, YOU'RE BANGED UP!

2. MOVE WHEN YOU HEAR THE DING-DONG.



3. "EYE" STOPS JAWS DEAD.

Simple Devices Lick Accident Hazards

Is it worth special effort to cut down accidents? The H. W. Lay Company of Atlanta, Ga., thinks so. And this potato-chip manufacturer goes to a lot of effort to protect its plant employees. Here are three simple devices this company has successfully used for three years to reduce safety hazards.

1. This life-size dummy (photo) is a constant reminder of injuries. He shows off his "blood"-stained bandages to all employees as they pass in and out of the plant. Every time there's an accident, the mannequin, dressed like a food-handler, gets another heavily Mercurochromed bandage over the area where the real-life employee was injured. He then moves to the department where the accident occurred, serves as a shocking reminder to all.

Bandages accumulate on the mannequin for a whole year. For example, since last July this fellow claims accidents to both hands, an eye, and a foot. When the dummy is not reminding employees of safety in a specific department, he stands at the employee entrance. Employees just can't miss him. And he's waging a successful campaign. In the past three years, the annual accident rate dropped from 148 to 20.

2. The ding-dong bell you see in the photo tells employees a fork truck is coming, makes them look up and get out of the way. With the high noise level at the Lay plant, trucks used to sneak up unnoticed behind walking employees. Sometimes workers didn't move aside fast enough.

To cut down on this type of accident, a simple warning bell was installed on one wheel of each truck. The picture shows an employee holding the shell, bought from an electrical supply house. It's the gong part of a fire or telephone bell with a ½-in. steel vane welded to the inside. As the truck moves, a ¾-in. steel ball rolls around the shell and clanks against the vane once per revolution. Cost of the gong was less than $5 per truck. Result: No pedestrian-truck accidents for the past two years.

3. Cocktail snacks come to you in fancy cellophane bags. But getting them in these bags sometimes creates a safety problem. The problem arises when the gripping and heat-sealing jaws must be adjusted while a packaging machine operates. Although no serious accidents have occurred, the jaws, exerting 300-psi. force, have claimed a number of scratched pinkies, to say nothing of all the close calls.

But the job isn't a risky one any more. A photoelectric cell at the right of the machine is aimed at a mirror at the left. When an operator reaches into the danger area, the "eye" shuts the jaws off, but leaves the rest of the machine functioning. With a re-set button on the upper frame, the operator can start the jaws in motion again. Cell is a $37 model used by homeowners to actuate door chimes.

Waterfall Painting Speeds Operation

Coating and drying time on flat panel painting is down from six hours per unit to 30 minutes. That's what this new flow-coater machine (imported from Switzerland) accomplishes for the school equipment division of Brunswick-Balke-Collender Company (Kalamazoo, Mich.). Brunswick engineers claim it produces a more uniform finish. Also eliminates paint waste.

Key to the speed of the operation is a "waterfall" of paint that bathes each wood panel. A trough placed beneath the waterfall catches excess paint before it becomes dirtied or otherwise useless, returns it at once to a 4-ft. reservoir ready for immediate re-use.

The machines (Brunswick-Balke-Collender has two of them) handle a wide range of colors. Whenever a color change comes, overhead tank and troughs are flushed out with thinner before the new color goes into them. A change normally comes before the start of the day shift. Thus there's no more than the usual night-time clean-up.

Three men operate the line. One loads panels and another unloads them. The third man keeps the line supplied with paint and parts. Conveyor belts carry the preheated panels through the machines at speeds of from 120 to 400 fpm. As for cleaning up any paint build-up, here's the rundown:

- Reservoir head castings get cleaned once or twice a week.
- Troughs get a daily cleaning.
- Conveyor belt spillage can be handled by simply wiping up paint.

YOU BE THE ARBITRATOR

(Continued from page 134)

The award—The arbitrator upheld the suspensions. He ruled there was a clear inference that if the men went home they would be subject to discipline. And the men had every reason to know this. In this company, suspensions for misconduct were administered by higher levels of management, not foremen.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Gets Data Faster

Finding data can be a chore for a person unfamiliar with a punched-card file system. But at Automatic Electric Company (Northlake, Ill.) a rapid two-way internal communications network makes it easy.

Employees used to make scores of personal trips to the company's data-processing department files. Now dialing a prescribed number puts plant people in touch with a file clerk via a Speakerphone. Advantage is there's no handset to hold during the conversation. At present, the punched-card department receives around 100 calls per day.

With no handset to worry about, the clerk has free movement of both hands while going through the files. After finding the needed material, she may relay information to the calling party without walking back to the instrument. This is made possible by a tiny built-in microphone and compact loudspeaker.

"GHOSTS" HANDLE HOT STEEL

These workers may look like ghosts complete with dragging chains. But they're very much alive. With these heat-resistant asbestos coats and hoods they can get near red-hot steel castings coming from a 1600-F. heat-treating furnace at the East Chicago (Ind.) plant of Blaw-Knox Company. After the men attach chains to a steel pallet for support, an overhead crane moves the casting to the water quench tank at right. Quenching "fixes" the metallurgical structure, gives castings the required physical properties to withstand service conditions.

HOW THE SOUTHWORTH LIFT TABLE* *improved roll handling* AT INTERNATIONAL

Photos
Courtesy of
International Paper Company

The flexible and economical rewinder loading installation, illustrated here, simplifies the mechanical handling of the heavy roll. In addition, the roll is readily placed into the bearings and locked into position without any undue jarring of the shaft and roll stand.

This is another example of how Southworth works with plant engineers to improve materials handling, cut costs by bettering the use of existing production equipment, and minimize waste . . . to say nothing about reducing accident hazards caused by chance, manual strain or fatigue.

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*Patents Pending

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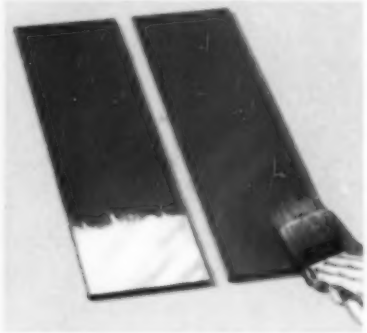
take brush!

Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound rusted surfaces. Saves costly surface preparations—lasts and lasts.

The **specially-processed** fish oil vehicle in the primer penetrates rust to bare metal—as proved in radioactive tracing studies.

Rust-Oleum, in its many forms, resists rain, fumes, heat, moisture, sun, and general weathering to stand up over the years.



Up to 30% more coverage with Rust-Oleum, depending upon the condition and porosity of the surface. Another Rust-Oleum difference.

See the many Rust-Oleum DIFFERENCES yourself!

Rust-Oleum primers and finish coatings are easily applied by spray. Flows smoothly . . . may be used in conventional, hot spray, or high pressure air-less spray.

A few easy strokes of the brush proves more than a thousand words . . . see how smoothly Rust-Oleum flows on . . . no pull, no drag . . . and it dries free of brushmarks. See, too, how much more coverage Rust-Oleum gives you . . . up to 30% more area depending upon the condition and porosity of the surface.

If your metal surfaces are *rusty* – simply brush or spray Rust-Oleum 769 Damp-Proof Red Primer right over the sound rusted metal after scraping and wirebrushing to remove rust scale and loose rust. The *specially-processed fish oil vehicle* in the primer penetrates rust to bare metal—driving out air and moisture. Easy as that to Stop Rust—and save time, money, and metal.

For *lasting beauty* – follow up with a Rust-Oleum finish coating in the color of your choice – from grays, greens, blacks, and aluminums to yellows, blues, whites, or browns – or from the many popular pastel shades.

That is the Rust-Oleum *System* of primer and finish coat for maximum over-the-years protection. A system that is measured by the money you save. Specify Rust-Oleum for maintenance, new construction, and re-modeling. Your Rust-Oleum Industrial Distributor maintains complete stocks for prompt delivery . . . he will be happy to consult with you on your coating problems.

What is your coating problem? What **color** do you need? Get lasting beauty in the color of your choice. Mail coupon for color charts.

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Every so often a lighting situation develops that just cannot be answered by conventional methods.

Take the installation shown above as an example. Here is a shop where precision machine work is performed daily. Lighting requirements call for effective vertical illumination on the key surfaces of intricate tools as well as even, high level horizontal lighting. Reflected glare from the polished surfaces must be kept at a minimum and shadows should be practically non-existent.

To meet the lighting requirements under these challenging circumstances, Sylvania engineers recommended a louvered fixture with 35° x 45° shielding and plenty of up-light to achieve two purposes . . . to eliminate unsatisfactory contrast between the fixtures and the ceiling background; and to achieve effective uniformity of illumination throughout the entire area. Very high output (1500 ma.) lamps were used to produce the 150 foot-candle level desired. And a special grid-type layout was used to provide lighting on vertical surfaces from all directions.

The result, as shown above, is uniform, high level lighting where workers perform efficiently in complete comfort. Production efficiency has increased and rejected parts have been reduced considerably.

This illustrates why it pays to check with Sylvania when a lighting problem confronts you. Sylvania's complete line of fluorescent fixtures . . . both industrial and commercial . . . gives complete freedom in selecting the exact fixture that will solve your problem best.

From now on, take your lighting problems to Sylvania . . . where good lighting is a science.

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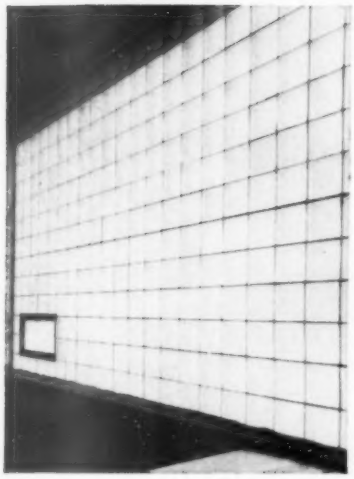

SOLVED—FOUR MAJOR WINDOW PROBLEMS

Are your window areas an eyesore? Do they leak dust and dirt; let in too much summer heat; drain heating system efficiency in winter? Do they create glare that cause workers discomfort and inefficiency? Does constant window maintenance put a dent in your budget?

Bermingham and Prosser Company, Chicago paper merchants, faced those four window problems when they converted a 141,000 sq. ft. grocery warehouse to their own paper storage and distribution operations. Vice President E. L. Todd reports: "We solved all our window problems by installing attractive panels of PC Suntrol® Glass Blocks."

Mr. Todd continues, "The clean, handsome panels made a vast improvement in the appearance of our building. Dust and dirt can't get through. The light diffusing action of the blocks eliminates harsh daylight glare. And the hollow construction of each block gives us good insulating efficiency.

"Expensive maintenance is a thing of the past. No more rusted out sash to be replaced. No more window pane breakage. No more constant window washing."

Solve *your* window area problems with PC Glass Blocks. Get full details in our new General Catalog. It discusses our standard line of Glass Blocks, and the new size unit—the 4 x 12. Get your copy by writing Pittsburgh Corning Corporation, Department N-79, One Gateway Center, Pittsburgh 22, Pennsylvania. In Canada: 3333 Cavendish Boulevard, Montreal, P. Q.

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You wouldn't think of using outdated production methods in waging your battle for business. Why endure prolonged production shutdowns because of old-fashioned maintenance-painting methods?

Because of the broad range of DeVilbiss spray equipment, you can efficiently mechanize your painting whether you have only occasional small jobs or expansive facilities to maintain. DeVilbiss offers the latest refinements in airless painting . . . compact pressure-feed outfits . . . equipment for painting ceilings and out-of-reach areas without using scaffolding . . . portable outfits that let you take hot or cold spray to the job anywhere, do jobs of any size swiftly cover any surface—brick, stucco, cinder block old wood, gratings, grillework, machinery. For DeVilbiss spray applies practically anything that wil pour, from decorative coatings to protective, sound deadening, and fireproofing materials.

Your production line is mechanized. Mechanize your maintenance painting, too! Your DeVilbiss representative or jobber is the one to call. You classified telephone directory is the place to look Look him up right now!

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4-man outfit, P-TVP-602 "Tuffy" outfit, NCE-605 1-man outfit, PL-604 new airless-atomization outfit, P-QH-601 1-man outfit, PJ-607 extension gun, P-NU portable paint heater, MH-4008 2-man outfit, P-UMC-605 2-man outfit, P-TVD-602 Remote-Cup Outfit, P-KB-602

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FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Never a twisted neck in plants with MultiForm, new industrial thermometer (*Precision*) that can be turned or tilted to most favorable reading position after stem is in place. Locks firmly in that position. **(291)**

For jam-free feeding of small to sub-miniature parts—automatically, of course—there's the Kicker (*Affiliated Manufacturers*). Seems it supplies an automatically timed and adjustable energy impulse (different from the regular amplitude) that jars jammed parts into further movement. **(292)**

Anybody who has to check copy (typist, proofreader, etc.), would probably give his (or her) shirt for an inexpensive copy-checking gadget (*Kee Lox*) that slides up and down on rollers, therefore stays parallel to copy. **(293)**

Your safety folks will like Putsy Foot, a foolproof ladder leveler (*Barberton Aluminum Specialties*). Takes risk out of ladder climbing on stairways, roofs, etc. Levels and locks itself when ladder is set in place. **(294)**

If you have any desire—or need—to inject lubricant in quantities as small as $\frac{1}{125}$ of a drop (200 millionths of an ounce) at a predetermined rate, have a look at a new miniaturized system—Micro-Measure (*Lincoln Engineering*)—for automatic lubrication of production machinery. **(295)**

Booklet of the Month is a 14-page fold-out brochure (*Heald*) that shows how replacement of old machines paid off for six companies. **(296)**

Slickest rubber fender we've seen is new one (*Goodyear*) built with flat base, tapered sides, rounded front. Will absorb shock loads created by docking trucks. Can be installed horizontally, vertically, diagonally. All hardware protected by fender. Supplied in lengths up to 19 ft. **(297)**

Your photocopying troubles will be ended the day you install new Trans-Star or Mercury (*Remington Rand*). Both are high-speed machines designed for point-of-use operation. Star is 9½, Mercury 15 in. wide. **(298)**

Many a mickle makes a muckle—especially if the mickle is Scotsman, that new, low-cost, fold-down container (*Union Steel Products*). Capacity, 4000 lb. Size, 40x48x24. Eight-way lift-truck entry. Safe-stacking legs. **(299)**

Less spray mist and fewer health hazards in paint shops equipped with Chemtronic, a new paint-spraying unit (*Lofstrand*) that utilizes a hydrocarbon compound (instead of compressed air) atomized by an electronic heating element. No mechanical parts involved in atomization, hence noiseless operation. **(300)**

Crammed with ideas for improving packaging and shipping methods is scant praise for 48-page catalog (*Signode Steel Strapping*). **(301)**

Working with high voltage? See that electricians wear gloves (*Charleston Rubber*) with built-in safety signal. If snagged or cut, black exterior is penetrated and bright red interior flashes warning. **(302)**

Liberal education in techniques of welding aluminum is there for the taking in 120-page spiral-bound booklet (*Air Reduction*). This comprehensive survey belongs in any aluminum user's library. **(303)**

Fire alarm (*Namrock Associates*) is no bigger than the palm of a man's hand, yet howls at 135 deg. Operates on two flashlight batteries. **(304)**

Another (*Standard Fire Alarm*) is powered by pressurized freon. Horn will blow good and loud for 20 min. No electric wiring necessary. **(305)**

And a small plastic label (*Pyrodyne*) registers permanent change from white to black when stated temperatures are reached. Currently available for indication from 100 through 700 F. **(306)**

Supervisory Growth (*Elliott Service*) is generous sampling (free, of course) of motivating material any company, large or small, can use to provide steady flow of dependable answers to recurrent job problems. **(307)**

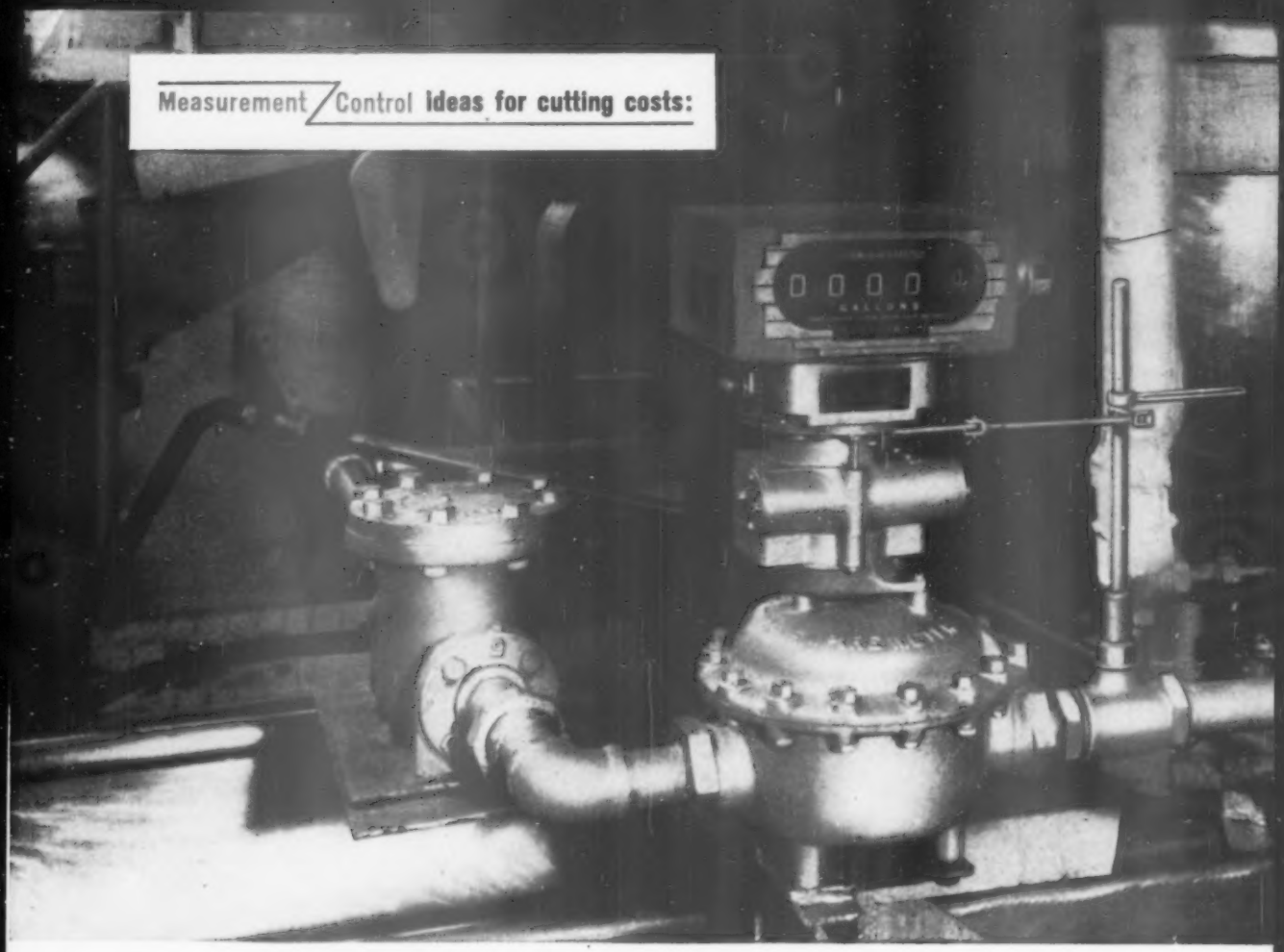
Pole-type construction may be answer to building needs. Figures cited in new booklet (*Koppers*) run as low as $1.05 per sq. ft. That means permanent buildings at a cost almost equal to temporary shelters. **(308)**

Safety signs, anyone? New catalog (*Brady*) lists more than 400 self-stickers that conform to ASA and NSC specifications for color, wording, and size. Stock signs available from 2½x4½ up to 3½x14 in. **(309)**

Good news for riveters—in the shape of a brand-new gun (*United Shoe Machinery*) that weighs only 4 lb., maintains peak efficiency even when connecting hose is 60 to 70 ft. long. Priced at less than a C-note. **(310)**

As for us, we're putting in for Flo-Tork, the new tilt control (*Bassick*) that makes office chairs respond to the slightest body movement. No more sudden jars when our desk chair tilts 'way back—as it so often does. **(311)**

More Ideas of the Month in Press Time Report following page 54



How a liquid meter SAVED A "BATCH" OF MONEY

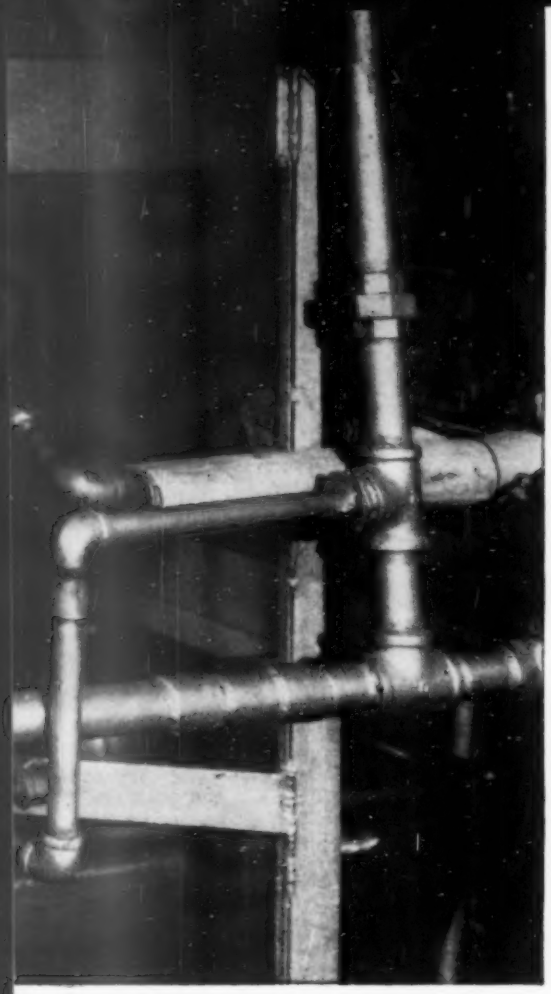
Above is shown Rockwell liquid meter with an automatic pre-determining shut-off valve. A Rockwell Field Engineer recommended the meter to replace manual batching of lard at a large midwest packing plant. Previously, the lard was carted to scales, weighed, and dumped into process vats. Now batching is *automatically* controlled and measured at considerable saving of time and money.

This is just one example of the many ways Rockwell Field Engineers are helping save time, money, and material in a wide variety of manufacturing and process plants by suggesting new and better methods of measurement and control. These field men represent Rockwell's experience as the world's largest manufacturer of measurement and control products. Wherever liquids or gases flow through pipe in your plant, this experience can help you cut costs and improve quality. Why not have a Rockwell Field Engineer visit your plant to explore new approaches to cost cutting through improved measurement and control. Send the coupon today—there is absolutely no obligation.

ROCKWELL

The leading single source for Measurement / Control products and ideas

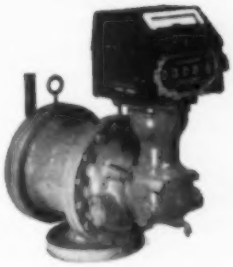
For more facts Circle 525 on Reader Service Card



"IN-PLANT" METERING:

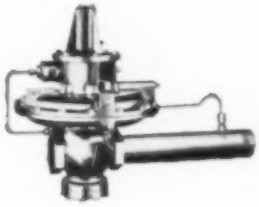
LIQUIDS AND GASES

Rockwell gas and liquid meters, properly applied, can improve quality control, sharpen cost control, and prevent waste in almost every plant department. A Rockwell Field Engineer can help you find *where* meters will cut costs . . . and Rockwell has a complete line of meters to measure practically anything that will flow through pipe.

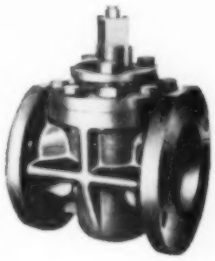


CONTROLLING PIPED MATERIAL:

LIQUIDS AND GASES



More efficient control of all the material flowing through pipes in your plant is a positive step in cutting costs. There are new applications and new ideas for using gas pressure regulators and valves that will stop wasteful, inefficient, and dangerous handling of fuels, production fluids, and products. A Rockwell Field Engineer can show you *where* and *how*.



HOW MUCH COULD YOU SAVE?

There is hardly a plant of any kind—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved. It will cost you nothing to have a Rockwell Field Engineer *show* you. Simply send the coupon below, now.

SEND COUPON NOW!

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☐ Please have a Rockwell Field Engineer call me for an appointment.

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☐ Others: _____

Name: _____ Title: _____

Company: _____

Address: _____

City: _____ Zone: _____ State: _____

HUMAN RELATIONS

By GEORGE A. HOY, JR., Industrial Management Editor, FACTORY

Best for the Handicapped

What's the best thing you can do for a handicapped employee? Nothing—in the way of help, that is. According to Therapy Supervisor L. M. Sperling, University of Michigan Medical Center, over-protecting a handicapped worker is a sure way to slow down his mental and physical adjustment.

Miss Sperling emphasizes the idea of making use of the handicapped person's remaining capabilities. But she cautions against pushing him into work he cannot do. Best procedure when in doubt about a worker's ability to do a particular job: Call in a consulting doctor or therapist skilled in work with the handicapped.

Have Show, Will Travel

Except for their business suits, you'd have thought the three men in the station wagon were off on a camping trip. Their car was loaded with cables, rope, and other gear. The car-top carrier could have held a tent and a folding boat. The three left the Wire Rope Division of Pittsburgh Steel Company on a delightful summer day last year. One was a material handling specialist, another a safety engineer, the third a sales-service engineer.

Instead of the north woods, the trio was off on an 11,000-mile trek of industrial plants. Instead of a tent and boat, the car-top carrier held a 4½x8-ft. double-hook bridge crane. The gear inside the station wagon was demonstration equipment. The three men and their gear were a traveling road show, selling safety in lifting to crane hookers, operators, and managers. The material handling man demonstrated proper hooking and lifting. The safety man pointed up accident causes. The sales-service engineer unveiled the facts about wire rope and other lifting equipment. Sure, they had an ax to grind. But, while grinding, they performed a real service for the plants they visited.

Brag a Little—It Won't Hurt

Your modesty may put rocks on your road to success. In other words, you may be one of the many Americans who find it easy to dwell on their mistakes but uncomfortable to think about their successes.

If this is you, here's advice from a man who has studied this problem extensively. He now teaches a three-step corrective formula at Fairleigh Dickinson University, Rutherford, N. J. He's Bernard Haldane of the University's School of Business Administration. His three-step formula:

1. Think about your achievements throughout your life. Make a mental list of your work and the personal, social, or scholastic activities of which you have been proudest.

2. Write brief descriptions of at least six of your greatest achievements on this list. Even if you feel others may think them small, choose the experiences that have given you a deep sense of pride and accomplishment.

3. Study the descriptions carefully. Look for qualities of talent and personality that appear repeatedly. These are the qualities that combine to make your success pattern.

Once you know your pattern, you'll be able to use the same one for future successes.

Prowling for Errors

The new men prowled the "bugged" plant. Their assignment: Find as many of the 40 material handling errors (set up deliberately in advance of their tour) as possible. The objective: training in material handling problem-solving.

It happens these men were novice salesmen for Colson Corporation (Chicago material handling equipment manufacturers). But the idea is applicable to your plant, because material handling problem-solving could be a valuable training course for your managers and workers.

Your Gal Friday Wants More

More responsibility, that is. She's a competent, hard-working secretary. She practically runs your office for you. Want to know why you might lose her to another job? Just try the following on for size, says Bureau of Business Practice, a division of VISION Incorporated, New York:

- You don't make use of her training, capabilities, and knowledge of your firm. You don't bother to train her to take responsibilities off your shoulders. You're consistently inconsiderate of her—you're the type who always dictates at 4:30 p.m. and wants those letters off tonight—please!
- You place a long-distance call, but disappear somewhere before the call comes in. A variation on this theme: You vanish for a few hours without telling your secretary where you have gone or when you'll be back. Then you give her you-know-what if you miss an important call or visitor.
- You dictate letters with a cigarette or pipe in your mouth. Or you keep papers in your desk instead of giving them to her to file.
- You never bother to tell her what's going on, so she never knows what's happening. You substitute "do this" and "do that" for "please." You drop "thank you" from your vocabulary.

Any of these things, says the Bureau, can lose a firm one of its most valuable members—the secretary. Here are some rules to guard against it:

- Give your secretary responsibility as fast as she can absorb it.
- Substitute earned raises for periodic increases.
- Streamline communication systems so that there's no duplication of effort and so that your secretary receives information she needs in her duties.
- Point out her errors with tact and give her constructive criticism.
- Remember that she may have more capabilities than she ever has a chance of showing. So the time you spend training her for additional responsibilities is well spent, if it frees you for other work.

High Overhead Can Be Good

From 1948 to 1955, the percentage of executive, administrative, professional, and technical employees at Firm C increased by more than one-third (from 7.5% to 10.2% of the workforce.) And the change is a sign of progress, not empire building.

Contrary to what you might expect, Firm C is doing a good job of controlling costs. The increase in cost of non-productive personnel has been more than offset by improvements in methods and operating efficiency. The managers and engineers are earning their keep and then some.

Firm C illustrates a trend, according to researchers—authors Samuel E. Hill and Frederick Harbison. (Their book: *Manpower and Innovation in American Industry*, Princeton University, 85 pages, $2.) These two men studied 50 companies in detail, found the employment of managerial and scientific personnel on the increase in many of the 50. And they found this a desirable quality in the company. Those companies that employed more high-powered men were the most active innovators, with the best record of product, process, and administrative improvements.

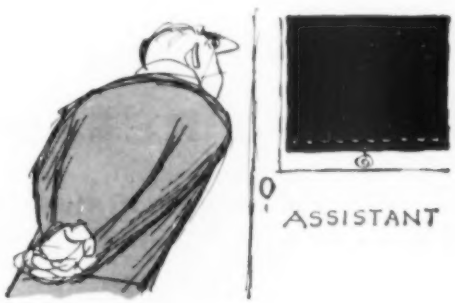
Hill and Harbison feel the trend toward more use of high-level manpower may require revision of wage and salary plans, personnel practices, and management development programs.

One change their findings clearly suggest: revision of the old rule that says, "Overhead (burden rate) should be kept to a minimum."

Trophy for Service

Every year an employee of Eastman Kodak Company (Rochester, N. Y.) has his name engraved on a big silver bowl. And he gets a smaller replica of the bowl to keep on his mantel at home. His feat: outstanding service to his fellow employees through KORC (Kodak Office Recreation Club).

Any reason why a similar club, and trophy, wouldn't be a worthwhile venture in your plant?



Closed Doors Below

It's a rare boss, say psychologists, who knows much about his immediate subordinate's job. The reason (according to a University of Michigan communications study) is fear.

It works this way: The subordinate wants to advance. He feels that his boss will get a bad opinion of him if he learns about the problems the subordinate experiences in his job. So he simply doesn't tell the boss about any of his problems. He reports only his successes. It's a form of Yesmanship, say the researchers.

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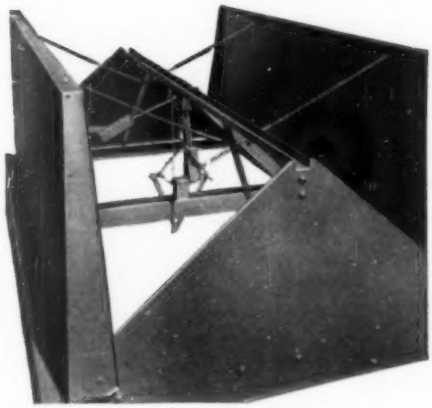
. . . gives more **Fire** and **Explosion Control** for industrial plants, auditorium stages, stairwells, elevator shafts



With Swartwout Pyrojectors you get positive fire and explosion control worth many times the small investment involved. Favored by insurance authorities, automatic release of heat, smoke or explosive blasts holds plant damage to a minimum.

Double-walled, thickly insulated and weather-tight dampers fly open when underwriters-approved fusible link melts at 212° F. Snubber springs and chains hold dampers vertical for maximum draft. Pyrojectors provide 28 square feet of free escape area.

Write today for full information about valuable Pyrojector fire and explosion control.

- **Stronger Spring** for positive automatic damper opening at 212° F. — even under load!
- **Extra-Rugged Damper Construction** for lifetime tight fits . . . eliminates leaks!
- **Improved Insulation** bonded securely to new square dampers prevents condensation, ends annoying dripping.
- **Fast, Easy Installation** — just one easy-to-make opening (between roof beams).
- **Handy, Extra Heat Relief** when needed. Opens easily with release chain, or by hand from roof.

The Swartwout Co.
Ventilation Engineering
18509 Euclid Avenue — Cleveland 12, Ohio

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By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc.; Member, New York Bar

Here's New Light on Employee Dismissals

Failure to dismiss employees properly may result in a lost arbitration. Worse, you can win an award and still hurt employee morale, a new survey shows.

"An employee who is discharged must be made aware of the rule he violated." "The rule must be reasonable." "The punishment must fit the crime." All these principles must be uppermost when meting out discipline. If not, you may lose an arbitration.

But a recent study conducted by Survey Research Associates of Scarsdale, N.Y., clearly indicates that a lost award may be the least of your company's worries. You may also damage morale. And low morale among employees has a penetrating and enduring effect. Strangely, the survey shows that this can happen even where you win an award. Survey Research warns:

"When you must dismiss an employee, watch the effect your procedure will have on your remaining employees! Our surveys of employee attitudes show a recent upsurge of fear of unfair or sudden dismissal without notice, particularly among non-union clerical personnel.

"Among a total of 2376 non-union employees in six different companies, 76% agreed: 'You can get fired around here without much cause.' Only 27% agreed: 'Dismissals are handled fairly.' Employees commented: 'I have seen employees fired without any explanation or warning.' 'Loyal employees are fired on 5-minute notice. There is no security at all.' But management cannot understand this attitude."

When shown these findings, the president of one company exploded: "But how can they say that? We seldom fire anyone; never without good cause. We're slower to let anyone go than any firm I know of. We try to help, arrange transfers, give warnings—and we always give at least two weeks' separation pay. It's never without warning. How can they feel that way?"

Then Survey Research goes on:

"Why this difference between employees' views and actual practice? Probing the response further, we noted some relation to the national business scene as well as to internal factors—supervision, work appraisals, etc. Most important, we found this virtually identical pattern:

"1. Management has always avoided the distasteful subject of dismissal. Three firms had an unwritten policy but never published it, and management thought the employees understood it.

"2. The few people dismissed were handed severance pay when they were notified (usually late Friday), and were asked to leave immediately. The reasoning: after notification an employee will not treat customers well; will not do much work; might have a bad effect on other employees; and management and supervision will feel uncomfortable continuing to face him.

"3. Fellow employees, learning the news the next Monday, spread it quickly. 'Where's Jimmy? Oh, Jimmy was fired Friday afternoon; he's not here any more.' NO mention of reasons, warnings, work discussion, or severance pay!

"Given this pattern, you can reconstruct the fear build-up: 'This company fires people without warning . . . Will I be next? . . . I'm afraid . . . What can I do?' "

The study points out that "if your employees believe something they act as if it is true. Fear and insecurity block productivity and initiative, cause well-trained people to leave the company. If you haven't told them, how would they know how you handle dismissals? It will pay you to build security, allay fear."

Finally, Survey Research offers this three-step plan to break the pattern of fear build-up:

"1. Establish a clear dismissal policy, if you have none. This should cover: (a) what actions bring immediate dismissal; (b) warnings about unsatisfactory work; (c) review of warnings by higher executive; (d) right of appeal; (e) severance pay policy.

"2. Publicize the policy in company media reserved for the most important announcements. Explain it to all new employees. Call it 'Employee protection against mistreatment or arbitrary dismissal.'

"3. If you must dismiss an employee, notify him as early as possible and discuss with him his situation and severance pay. Let him work at least a full week more, but allow time off for job hunting."

New Experience for Lawyers

Union assaults on company lawyers are avenged by this recent NLRB ruling.

Attorneys who dish out legal advice on labor relations know they stick their necks out, but they have always considered themselves far enough behind the lines of battle to be safe from assault and battery. Fatigue from the stress and strain of all-night negotiation sessions may be contemplated as an occupational hazard. But contusions and abrasions—never!

Rough-and-tumble United Packinghouse Workers Union pickets made labor law history recently when they expressed their feelings about the legal profession by severely beating up two lawyers who had wandered into the premises of their employer.

This was a bad example to set, ruled the NLRB, and a violation of the NLRA. Not because it was an assault on the sanctity of the law and lawyers, as lawyers would

No more drudgery for me in cleaning grease-caked floors

A flip of the switch re-sharpens brushes automatically!

His boss is happy too . . .

and should be. Now an Industrial Dry-Scrubber, Finnell's 84XR at left, does the job in about one-tenth the man-hour time required to hand-scrape the floors! And of course the machine is far more thorough, and spares maintenance men the back-breaking effort of manual methods. Equipped with two powerful scarifying brushes, the *84XR* digs through and quickly loosens even the most stubborn coatings of dirt, oil, grease, and shavings. Universal couplings enable the brushes to clean recessed areas that rigid coupling brushes would pass over and miss.

Reversible motor keeps wires sharp. *A flip of the switch* reverses the rotation of the brushes and re-sharpens them automatically . . . *while working!* Eliminates the need for frequent changing of brushes by hand in order to maintain a sharp cutting edge. Reversal of brush rotation also helps keep the brushes functioning efficiently by ejecting sticky substances that would otherwise clog and slow up the cleaning process. Total brush spread of the *84XR* is 22 inches. Low, compact design permits cleaning right up to and beneath machinery – areas where deposits are heaviest. Interchangeable rings and brushes adapt the machine to wet-scrubbing, polishing, and steel-wooling.

Brushes adjust to floor irregularities

Clean floors allow industrial trucks to move swiftly, surely and, according to actual tests, with *half the pull* it takes to move loads over dirty floors. In addition, clean floors aid safety underfoot and contribute to worker productivity. So it pays to keep floors clean – especially with a labor-saving *84XR!* (The Vacuum Cleaner at extreme left, *Finnell's 10C,* features a 1½ hp, 115v AC-DC By-Pass Motor. Tank capacity: *Wet,* 12 gallons . . . *Dry,* 1¼ bushels.)

For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2507 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

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like to think, but because it "demonstrated to both striking and non-striking employees who witnessed the assaults, or were likely to hear of them, that they would suffer similar reprisals if they did not support the strike." We wonder what the legal fees for this negotiation were!

You Can Be Adamant

The NLRB gave this company the right to insist (during negotiations) on including its pet no-strike clause in the union contract.

The law says that when a union contract is in the making you must bargain in good faith with the union. If you insist upon including a pet contract provision in the contract with an attitude reflecting the immobility of the Rock of Gibraltar, you run the risk of being told by the NLRB that you are not bargaining in good faith.

While no-strike clauses are commonly found in union contracts today, the Lloyd A. Fry Roofing Company (Summit, Ill.) insisted on one with a pet twist. It read: "During the term of this agreement, there shall be no lockout on the part of the company and there shall be no strike, slowdown, picketing, or other curtailment or interference with production or other work, in or incidental to company business by union, its members, *or any employee.*"

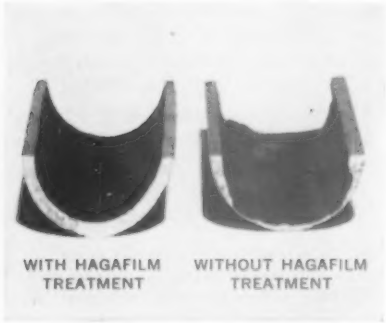
The union balked about taking on the responsibility for wildcat walkouts of employees who were not in the union and absolutely refused to agree to it. And the company just as firmly refused to budge an inch. The company was hauled before the NLRB for refusing to bargain.

The NLRB went along with the employer this time. Found nothing illegal about the clause itself and found nothing illegal about the company's insisting upon it. The Board previously said that although employers are obligated to bargain in good faith with respect to wages, hours, and other terms and conditions of employment, there is nothing in the law that compels either party to agree.

Timeless Pension Plan

Taking the bull by the horns, this union ties pensions in directly with the BLS consumer price index in an effort to beat the rising cost of living.

Employers, unions, and insurance companies have been keenly aware that a pension planned today may be totally inadequate 20 years from now when the employee actually retires. Old rascal cost-of-living increase has been whittling away at pension commitments. Equity annuity and similar plans have been worked out to help



Central generating station, U.S. Bureau of Mines, Bruceton, Pa. Hagafilm, in use here since 1951, is added with the boiler feedwater to form a protective film on condensate lines.

Quick case history—reading time 58 seconds

How U. S. Bureau of Mines protects miles of condensate lines with Hagafilm

THE PLANT: The U.S. Bureau of Mines experimental station occupies a 259 acre tract of land at Bruceton, Pa. Process and heating steam is generated at a central boiler plant by four 250 H.P. units. There are several miles of steam and condensate return lines connecting the boiler plant with over 100 steam-using buildings.

THE PROBLEM: Plant records showed continuously high maintenance and replacement costs for condensate return lines, traps and valves. Corrosion rates, as measured by pre-weighed test specimens, were 56 mg/dm²/day. (25 mg/dm²/day indicates serious corrosion.) Because of the considerable distances involved, an extremely active and well distributed inhibitor was required to protect vulnerable return lines against oxygen pitting as well as low pH carbon dioxide grooving.

THE SOLUTION: Hagafilm met the Bureau's requirements. A long chain amine inhibitor, Hagafilm forms a non-wettable, protective film on surfaces contacted, starting from the point of condensation. It was initially shot-fed four times daily to the operating boilers at a rate of 2 ppm, based on steam produced. Subsequently, the feed rate was reduced to 1 ppm. Once an adequate film was formed, less Hagafilm was needed to keep the lines in good condition.

TEST RESULTS: Corrosion rates have dropped to 2.7 mg/dm²/day. Trap maintenance and pipe replacements are now almost nonexistent. The top photo illustrates Hagafilm's ability to protect lines from corrosion problems. The pipe section at the right developed a dangerous degree of corrosion after 10 years service without Hagafilm . . . the section at the left shows negligible corrosion effects after 7 years use with Hagafilm added.

FOR FULL INFORMATION on how Hagafilm can solve your corrosion problem safely, quickly and economically, write for bulletin 410-12-7 or contact:

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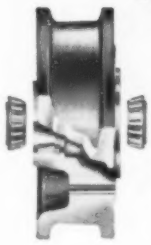
It Costs Far Less to Build a Crane Locally from Wright Matched Components!



TREAD WHEELS
Made of special car wheel iron with the tread deep chilled to a hardness of 450-500 Brinell. Tapered tread is self-aligning.

END TRUCKS
Welded steel channel construction with heavy steel plate diaphragms. Squaring shaft of ground and polished steel.

CRANE DRIVE UNIT
Consists of electric motor and well-proportioned gear reduction. Solenoid "drag" brake. Size 1—motors up to 2 HP. Size 2—3 or 5 HP motor.

• Now, buy a dependable WRIGHT B-514 Top Running Single Bridge Crane the modern, money-saving way! Here's all you do! Instead of paying shipping costs on a complete crane, order only the matched components—end trucks, crane drive unit, trolley hoist—from the WRIGHT factory. Then, buy heavy I-beam structurals from a local source. This way you realize big savings by greatly reducing freight charges. In addition, WRIGHT also furnishes you with detailed plans for assembly, including a list of essential structural components to be bought locally.

A FEW OF THE WRIGHT B-514 FEATURES:

Controls • Single-speed push button controls are furnished with fluid-drive models, variable-speed push button controls with models without fluid drive. Variable speed controls have five selective speeds for speeding and slowing crane travel.

Fully Integrated Electrical Controls for the B-514 assembled locally with a WRIGHT Hoist and WRIGHT Crane Drive Unit are factory-installed at no extra charge.

Two Timken Roller Bearings to each wheel. Placed in opposition to one another, they compensate for radial and thrust loads.

Complete information about the WRIGHT B-514 Crane and other WRIGHT products is available by writing our York, Pa., office.

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powerful **HEIN-WERNER HYDRAULIC PUSHMASTER RAMS**
speed up production; materials handling; maintenance

Save time and manpower on tough jobs with Hein-Werner PUSHMASTER Hydraulic Rams in 4 to 60 tons capacity. Easy controlled power whenever needed for lifting, bending, pressing, leveling and straightening. All models include safety valve, Quick Coupler and provision for gauge attachment. Hand or power actuated. Neoprene Quad-Ring provides double sealing action. Standard thread interchangeability on 10 and 20 ton capacity units. One-piece, leakproof body construction on 30 and 60 ton units. Mail coupon below for free copy of detailed catalog No. 25, or consult your industrial distributor.

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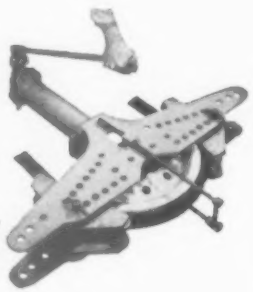
HEIN-WERNER PORTABLE TAL BENDERS
in ranges from ⅜″ to 8″



Reduce costs up to 75% by bending pipe, conduit and tubing with Hein-Werner Portable TAL BENDERS. They're fast, effective, safe – designed to save you time and money. Offer features that mean smoother bending on-the-job. Send coupon below for free copy of catalog No. 35 which details the many sets and combinations available, or see your industrial distributor.

Hein-Werner CORPORATION WAUKESHA, WISCONSIN

Hein-Werner also supplies industry with a full line of hydraulic jacks in capacities of 1½, 3, 5, 8, 12, 20, 30, 50 and 100 tons and "Push and Pull" Hydraulic Jacks and Attachments in 4, 10 and 20 tons capacity.

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1200 NATIONAL AVENUE, Dept. 111
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Begins on page 156

keep pensions in line with increases in the cost of living. Based on an employer's putting some of his pension plan money into stocks, the theory is that as the cost of living rises so will the value of the stocks and a leveling effect will result. But there is no common system in force for passing such benefits on to pension plan members.

Impatient with this lack of systematic income adjustment for the pensioner, the Chicago Truck Drivers Union recently negotiated an employer agreement that ties pension payments to the BLS Consumer Price Index. Pensioners will be paid $75 per month base. And as the Index goes up, so will their pension payments, provided there's money in the pension fund. Theoretically, we suppose, the money needed to meet the newly negotiated pension formula will come from the increased value in the fund as a result of stock investment. But just in case things don't work out as expected, the trustees have the right to chuck out the cost-of-living formula later on.

No Discharge for Moonlighters

Union's demand for discharge of moonlighting employees violated the National Labor Relations Act.

To spread work in the trades and keep labor rates up, union bylaws often forbid their members to hold down two jobs. It was this way with Local 271 of the IAM of Birmingham, Ala., which had a maintenance-of-membership contract with employer J. W. Cheney. For the employee who disobeyed this rule it meant punishment by the union. Any punishment, the union thought, would fit the crime.

Three workers dared put it to the test. And the union thought a fitting punishment was discharge. Asked the employer to fire them. He refused.

The NLRB ruled that the discharge demanded by the union was a violation of the NLRA, despite the employer's refusal to go along with it. The Board reiterated the well-established rule that a union can insist on discharge only for non-payment of fees and dues.

Fast Strikers Lose Out

This union didn't wait the prescribed time after serving notice on the Mediation Service before it struck. And the strike was declared unlawful.

Busy plant executives are impatient with the technicalities of the law, often rightly so. But here's one technicality no employer should be unhappy with. It made unlawful an otherwise lawful strike. It involves the NLRA's "cooling off" regulations.

A union must give the employer 60 days' notice of its desire to change or terminate the contract. Then it must give the Federal Mediation and Conciliation Service similar notice within 30 days after notifying the employer. After this a union can strike.

A retail clerks' local served the 60-day notice on its employer. Gave the Mediation Service notice 86 days

Turn to page 164

For more facts Circle 531 on Reader Service Card
For more facts Circle 532 on Reader Service Card ➤

another G-E PROJECT '8000' development

GENERAL ELECTRIC ANNOUNCES . . .

New Custom '8000'* Motors

PROJECT '8000' . . . a major General Electric program of research, redesign, advanced manufacturing and improved customer service on A-c motors 150 to 6000-hp.

*Trademark of General Electric Co.

CUSTOM DESIGNED . . . New General Electric Custom '8000' motors are built specifically to meet your requirements. Selecting from specially designed enclosures, advanced insulation systems, custom-designed end shield and bearing constructions, and more than 15 custom-designed accessories—plus a countless number of electrical designs—General Electric engineers will create a motor to meet exacting needs, provide initial and continuing economy, and give long, reliable service. Turn page for features of new Custom '8000' motors.

NEW CUSTOM '8000' MOTORS GIVE TOP PERFORMANCE WITH LESS MAINTENANCE . . . HERE'S WHY

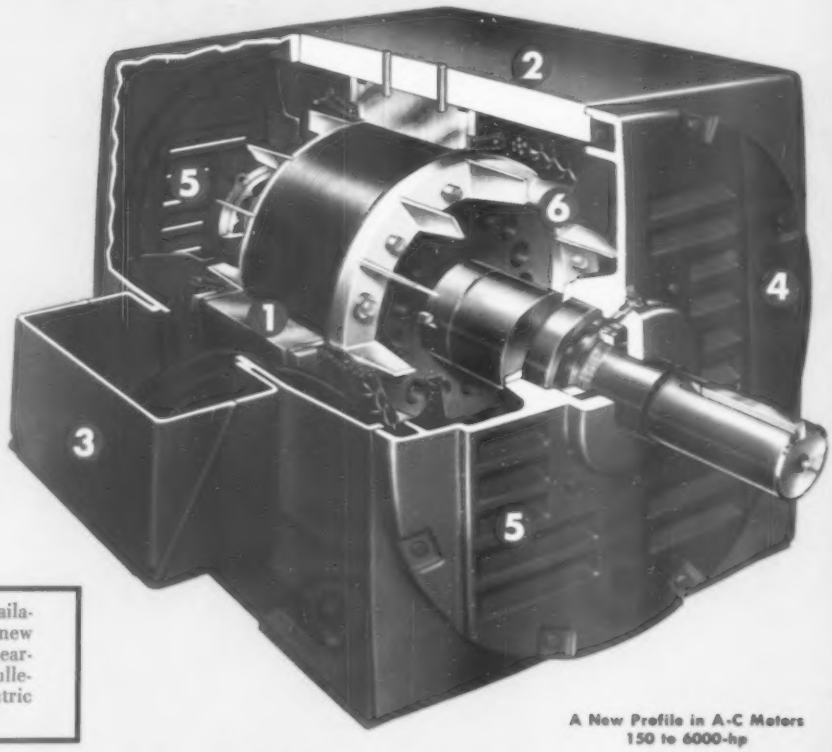
GENERAL ELECTRIC

FROM GENERAL ELECTRIC . . .

another G-E '8000' development

NEW Custom '8000'* Motors Give Greater Reliability Require Less Maintenance

1. **LONGER INSULATION LIFE**—Pre-wound core allows closer quality control and gives longer insulation life through improved varnish impregnation or silicone rubber encapsulation.
2. **BETTER CONSTRUCTION**—Cast iron frame withstands 20G simulated transportation shock tests; resists corrosion.
3. **FASTER INSTALLATION**—Conduit box has up to 3 times volume of ordinary boxes; lifting lugs, cast to frame, hold up to 12 times motor weight.
4. **EASIER MAINTENANCE**—Flat end shields are more adaptable to addition of accessories or modifications; are lighter—easily handled by one or two men.
5. **BETTER COOLING**—Double-end ventilation, new duct design and louvred air openings provide more efficient air distribution through motor, reduce hot spots.
6. **LOWER NOISE LEVEL**—Sound power has been cut up to 50% by redesigning frame sections, rotor fans, air deflectors and intakes.



A New Profile in A-C Motors 150 to 6000-hp

FOR COMPLETE INFORMATION and availability dates about General Electric's new Custom '8000' motor line, contact your nearby Apparatus Sales Office, or write for bulletin GEA-6865, Section 884-2, General Electric Co., Schenectady, N. Y.

NEW Polyseal* SILICONE RUBBER INSULATION SYSTEM IS AVAILABLE ON CUSTOM '8000' MOTORS

Silicone rubber used in Polyseal insulation systems is a product of General Electric's Silicone Products Dept., Waterford, N. Y. . . . a leader in research, development, and manufacture of silicone materials. Supported silicone tape is a development of General Electric's Insulating Materials Dept., Schenectady, N. Y. Combining silicone rubber with dacron-glass supporting materials is a major engineering advancement, giving this material both the mechanical and dielectric strength required for use as a motor insulation. Polyseal insulation systems are available *only* on General Electric motors, Medium AC Motor & Generator Dept.

FORM-WOUND MOTORS

Polyseal supported silicone rubber insulation system provides greater mechanical, thermal, voltage and environmental endurance than unsupported silicone rubber. Glass fabric materials are imbedded in each layer of silicone tape, which, after coil wrapping is vulcanized under heat and pressure to seal the system against moisture and contaminants. General Electric form-wound open motors with Polyseal insulation system can be used in some severe atmospheres formerly reserved for totally-enclosed motors.

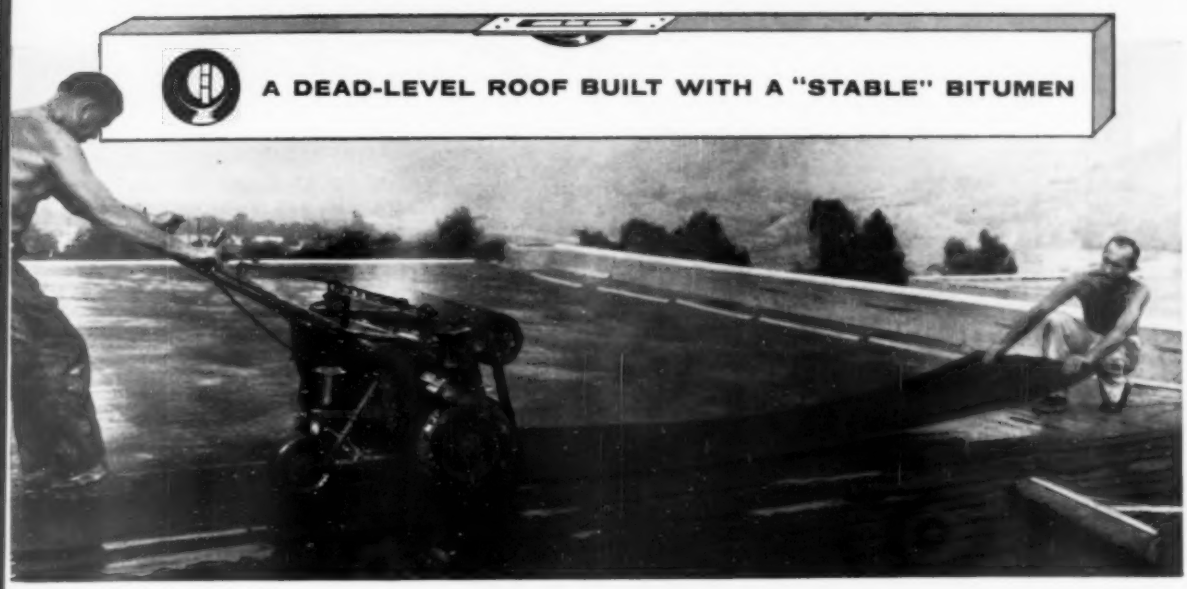
RANDOM-WOUND MOTORS

Polyseal silicone insulation system offers greater flexibility and better heat transfer than existing encapsulations . . . it operates effectively from −90C to 200C and will not crack under excess thermal cycling or severe moisture. After receiving G.E.'s standard random-wound insulation treatments, Polyseal insulation is applied to stator and end turns, completely sealing windings with a thin, waterproof, inert covering which protects against extreme moisture, most chemical fumes, dust and corrosion.

*Trademark of General Electric Co.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Johns-Manville *Aquadam* Built-Up Roofs

Better to begin with—better through years of service

One reason why these dead-level roofs last so long and serve so well is the stability of their unique bitumen, J-M Aquadam. It combines the best features of coal-tar pitch and of asphalt without their weaknesses.

At the beginning of a job, when heated to liquefaction, Aquadam has exceptional kettle stability . . . a prime indication that it will reach the roof with its original characteristics intact. This means better application either by machine or by mop.

Then, through years of service, Aquadam shows superior stability on weathering. It resists oxidation and hardening; will endure continuing exposure to sun, wind and rain.

In addition, Aquadam offers these other advantages: lifelong "self-sealing" properties; high ductility; and dependable protection under wide-range climatic conditions.

For further information on how Aquadam Built-Up Roofs pay off, send for a copy of booklet, "J-M Aquadam Built-Up Roofs." Write to: Johns-Manville, Box 158, New York 16, New York. In Canada, write Port Credit, Ontario.

JOHNS-MANVILLE JM PRODUCTS

For more facts Circle 533 on Reader Service Card

Clarke POWER SWEEPERS

–do the work of up to 20 men!
–cut sweeping costs up to 80%!

It's Clarke's newest addition to the nation's best known line of floor machines. It's built to sweep cleaner, faster and more dust-free than any other sweeping method. Picks up all types of debris, covers up to 50,000 sq. ft. per hour, sweeps right up to walls, maneuvers easily, slashes man hours and sweeping costs.

Write for new brochure. Better yet, ask your Clarke power sweeper distributor for an on-the-job demonstration.

CLARKE FLOOR MACHINE COMPANY
Formerly Clarke Sanding Machine Company
767 E. Clay Avenue, Muskegon, Mich.
Authorized Sales Representatives and Service Branches In Principal Cities. In Canada: Clarke Floor Machine Co., (Canada) Ltd., 21 Advance Rd., Toronto 18, Ontario

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Cut Finishing Costs
THROUGH INCREASED PRODUCTION

CLAMPS AND FIXTURES
Positive pressure and exact registration of the part in the mask. Reduce rejects. Free both hands for productive movements.

AUTOMATIC MACHINES
Increase production hundreds to one over hand methods. Reduce labor costs. Eliminate need of experienced workmen.

MASK WASHING MACHINES
50% faster than any other make. Cut solvent consumption. Avert production delays due to damaging of masks by hand scrubbing.

SPRAY PAINTING MASKS
A competent engineering staff will counsel with you on the most efficient technique for handling your particular requirements.

Send for Free Literature Now!

CM
Conforming Matrix
CORPORATION

420 TOLEDO FACTORIES BUILDING TOLEDO 2, OHIO

For more facts Circle 535 on Reader Service Card

Begins on page 156

after it notified the employer. Went out on strike 10 days after it notified the Mediation Service.

The union readily admitted it was wrong in not serving the Mediation Service within the allotted 30 days and was perfectly willing to take the rap on this score. But the National Labor Relations Board felt that the *strike itself was unlawful* because it occurred 10 days after the Mediation Service notice was given. The strike couldn't be called until 30 days after such notice, it argued. A U.S. court of appeals agreed with the union's lawyers that the language of the law was not too clear. But the court upheld the NLRB on the theory that its interpretation jibed with Congressional intent.

No Case on Retirement

A union can't upset compulsory retirement under your pension plan even though it's not a negotiated plan. Especially if the union has gone along with it for years.

Is this your situation? You have had a pension plan for many years. It calls for compulsory retirement at age 65. Along comes a union. It negotiates with you about everything under the sun. But pensions aren't mentioned. Several contracts are renewed. Still nothing said. One fine day, the union rears up, points a finger at one employee who was compelled to retire under the plan, and says you shouldn't have done it. Calls it an improper discharge and demands arbitration.

This is about what happened to the American Stores Company. But with courage and imagination, fortified by arbitration awards and some court decisions, American Stores promptly went to the U. S. District Court for the Southern District of New York and asked the court to rule that the dispute was not arbitrable. And the court so ruled. Arbitration in a case like this, it said, would be an abuse of the process.

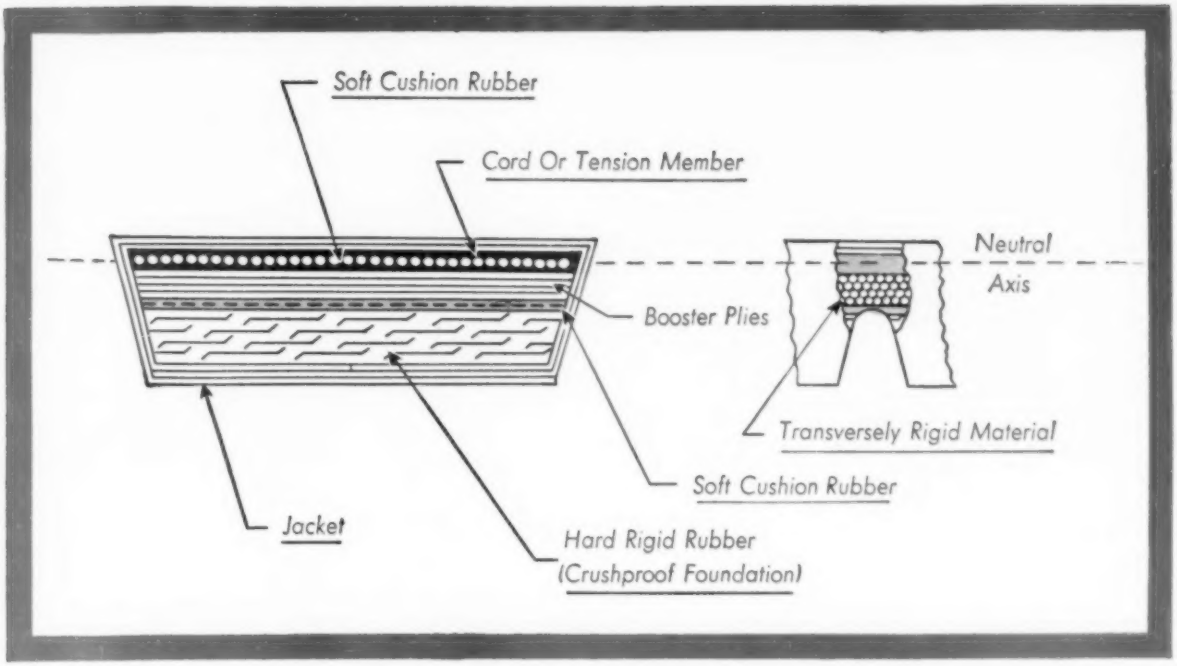
No Benefits, No Dues

A federal court and the NLRB agree that a union can't hold up the effective date of a contract until more employees sign up with the union.

In Denver, a Teamster local was certified as the exclusive bargaining agent for the company's production and maintenance employees. But when the first contract had been negotiated and was ready for signature, only 40 of 80 employees had signed up for membership in the union and authorized a dues check-off. The union was supposed to have made it clear to all concerned that the contract wouldn't become effective until 80% of the employees had signed up. There was conflicting evidence on this point, but apparently the union had failed to do this. Since the contract called for a 7¢-an-hour increase, it wasn't long before the workers got the idea and the 80% sign-up was attained.

The case went to the NLRB, which ruled that there was coercion. It ordered reimbursement of dues checked off for the period when the employees were without contract benefits. A federal court upheld the Board.

US ROYAL VARIABLE SPEED BELT



HERE'S WHY THIS VARIABLE BELT IS NON-SQUASH, NON-SAG

No excuse for any more variable speed belt problems. The U. S. Royal Variable Speed Belt will lick any production problem – where other belts try and fail.

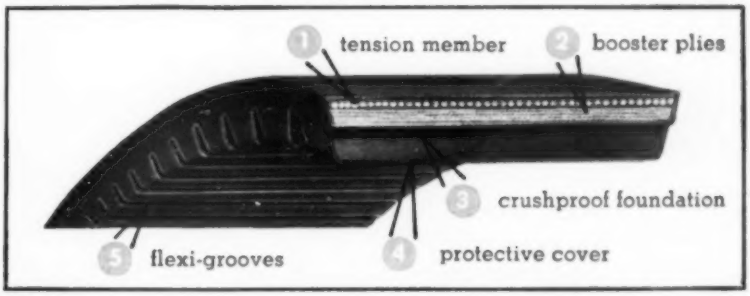
Note in the diagram the use of hard rigid rubber – the soft cushioning rubber in which cords or tension members are imbedded – the special jacket (oil and heat resistant).

The exclusive and complete crosswise rigidity in U. S. Royal prevents squashing. Lengthwise stretch is just about zero, by every test. *No sagging.*

U. S. Royal has complete accuracy regardless of speed changes – whether you switch from 2000 rpm to 10. It has scored a complete success in every textile mill, pulp and paper mill, chemical plant and metal working plant in which it has been installed.

• • •

Your nearest "U.S." Power Transmission Distributor will be glad to demonstrate the U. S. Royal on your own drives, at your own plant. You'll save a great deal in replacement costs and down goes downtime.



Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

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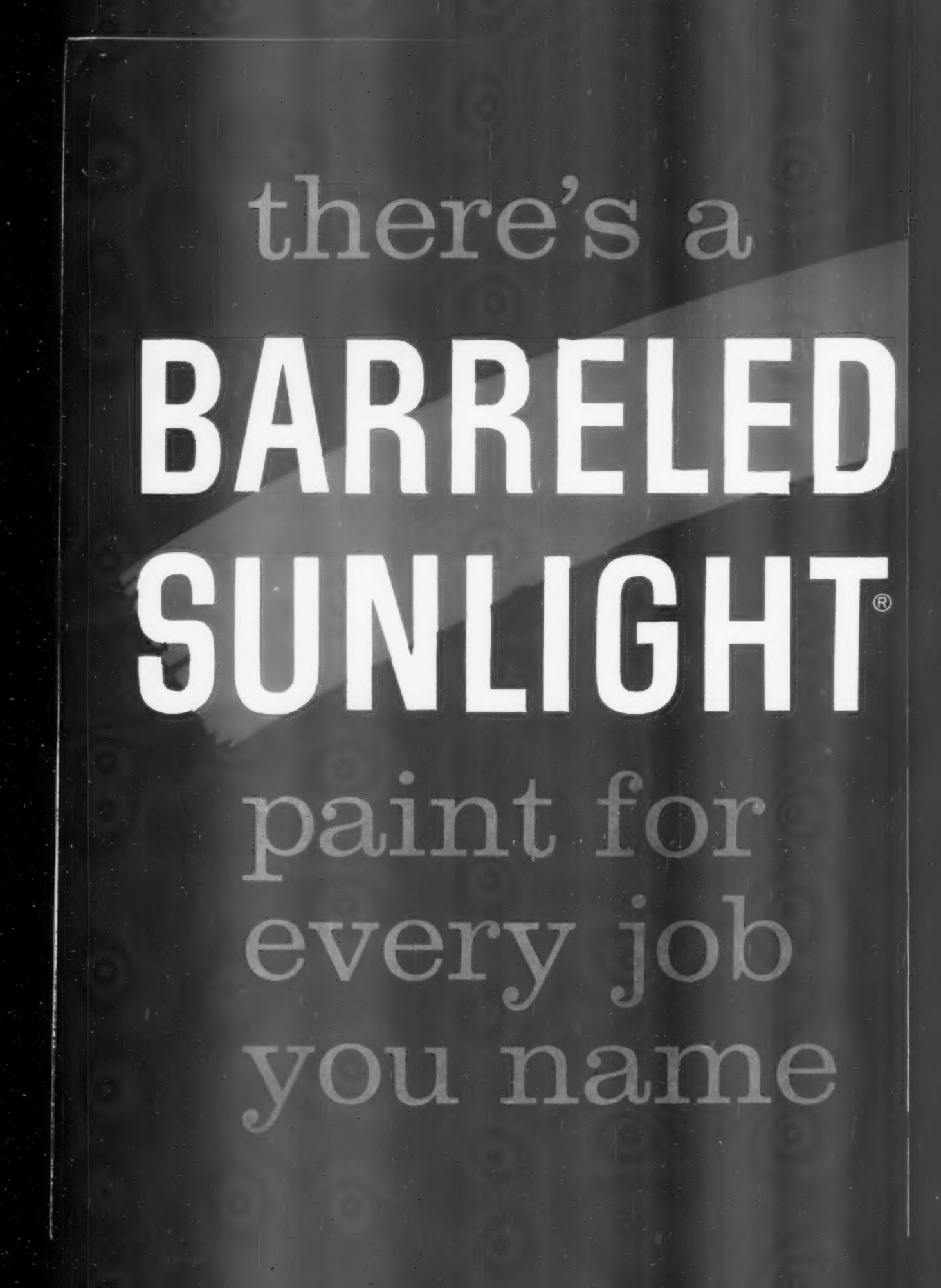
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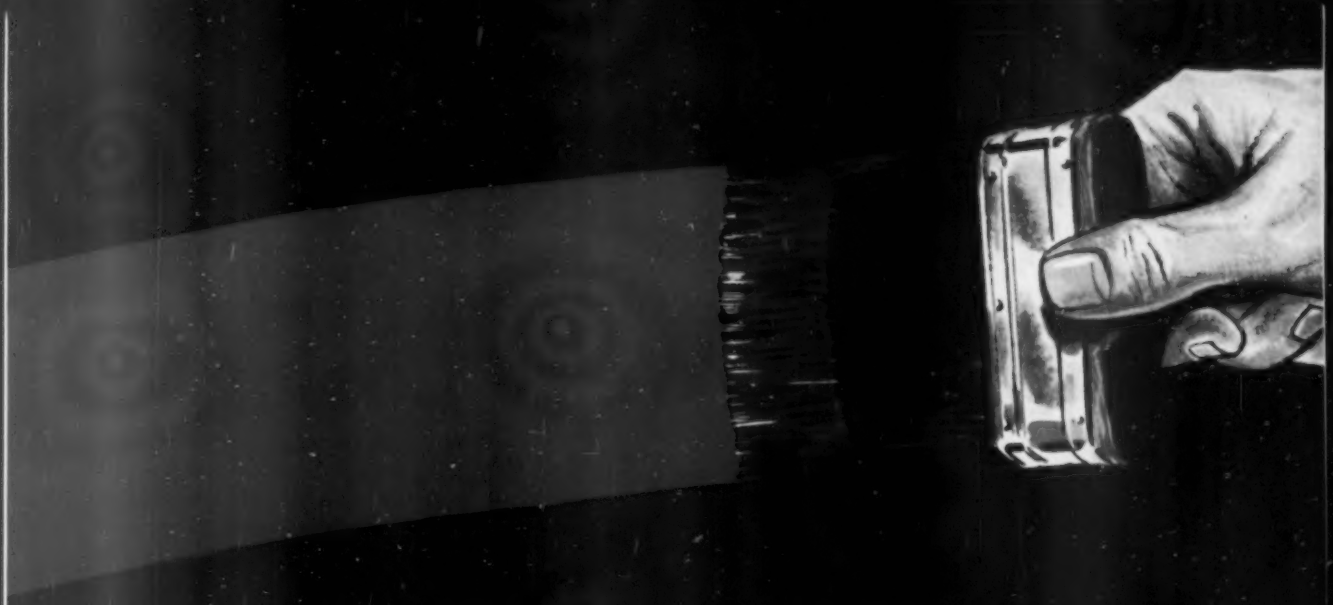
BARRELED
SUNLIGHT®
paint for
every job
you name



NAME YOUR NEED!

These are just a few of the many job-engineered paints in the complete Barreled Sunlight Line

Acid and Alkali Resistant Coating — Barreled Sunlight *Acid and Alkali Resistant Coating* protects against the destructive action of corrosive agents such as acids, alkalies, fumes, gases, water and excessive humidity. Recognized throughout industry for its effective and enduring protection of wood, metal, brick, concrete and other plant construction materials. White and colors.

Aluminum Paints — Barreled Sunlight quick drying Aluminum Finishes provide greatest brilliance, durability and hiding power. *Liquid Aluminum*, for general inside and outside use, resists temperatures up to 300°F. *Heat Resistant Aluminum*, for interior and protected exterior surfaces, resists temperatures up to 600°F.

Machinery Enamel — You need a quick drying, high hiding, oil and grease resistant finish for the maintenance of machinery and general equipment. Barreled Sunlight *Machinery Enamel* has all these, plus outstanding adhesion, toughness and flexibility. Dries to a light-diffusing "modified gloss" which eliminates objectionable glare. All popular machinery colors.

Mildew Resistant Paints — Where high heat and humidity combine to create mildew, mold, or fungus problems, Barreled Sunlight *Mildew Resistant Gloss* provides the ideal protective coating. Thoroughly field tested under toughest conditions, this specialized white interior finish has excellent whiteness and hiding power.

Rust Inhibitive Coatings — Here's the easy way to "give rust the brush" on all interior and exterior iron and steel. Barreled Sunlight *Chromate-Lead-Oxide Metal Primer* combines the corrosion-inhibitive qualities of zinc chromate, red lead and iron oxide in a durable, weather-resistant synthetic vehicle. For economical protection of exterior metal, specify Barreled Sunlight *Rust Inhibitive Primer* — pure Iron Oxide in 100% linseed oil.

Heat and Fume Resistant Finishes — Where a heavy duty, non-yellowing white paint is required to resist discoloring action caused by a combination of fumes and dry heat, Barreled Sunlight *Chemic Enamel* offers white paint advantages for ceilings and walls of many plant interiors where no other white paint has yet justified its cost.

Ceiling and Wall Paints — For heavy duty maintenance painting of new or old plant interiors, specify Barreled Sunlight *"Super Hiding" Interior Finishes*. Intense opacity often permits one-coat repainting under conditions which normally require two coats. Flat, Eggshell, Semi Gloss and Gloss. Non-yellowing Whites plus engineered Wall and Dado Colors.

If you have a paint problem, it will pay you to call in a trained Barreled Sunlight representative for practical recommendations. He will be happy to show you how you can make substantial savings in material and labor *over any paint you have ever tried in the past!*

FREE "Color Survey" To make the best use of paint and color we invite you to take advantage of the Barreled Sunlight "Engineered Color" Survey. At your request — and without obligation — a Barreled Sunlight representative will make a personal survey of your plant and submit recommendations for a complete, practical painting plan. Try this free service now.

Barreled Sunlight Paints

ENGINEERED

FOR A BETTER LOOKING, LONGER LASTING PAINT JOB AT LOWER COST

BARRELED SUNLIGHT PAINT COMPANY
2-G Dudley Street, Providence 1, Rhode Island

☐ Please send me your color chip catalog showing the complete line of Barreled Sunlight Heavy Duty Maintenance Paints.

☐ I want to try your free "Engineered Color" Survey Service. Please have your representative contact me for an appointment.

Name .....

Company .....

Street .....

City ..... *State* .....

One Battle We're Losing —And Why

Lest it seem self-serving, we of McGraw-Hill, as publishers, have hesitated to make the following statement about the "Battle of the Books." However, our reticence has been overcome by our conviction that it is greatly in the national interest to have much wider public understanding of the nature of this battle. This conviction is strengthened by the fact that many, not in the publishing industry, believe in the importance of this battle and, further, by the fact that it is a battle which the United States is losing.

The United States is losing an important battle — a battle of knowledge and ideas, waged with books. It does not have the excitement of competition in scientific achievement, nor the urgency of a diplomatic crisis, nor the obvious economic significance of a struggle for export markets. But our success or failure in this battle of knowledge and ideas may well have a decisive bearing on these more spectacular aspects of international rivalry.

The Russians know this. About a decade ago, they started a program to build up their export of books, the most durable and penetrating way of communicating knowledge and ideas. **By 1957 the Soviet Union was exporting 30 million books, one-and-a half times as many as the United States.** Many of these books are printed in English, and all are in languages of the non-Communist world.

In the languages of the Near East alone, the Russians printed and distributed 413,600 books in 1957, as compared with 166,415 in 1956. In India, Russian textbooks on engineering are to be published in English under a technical aid agreement signed in Moscow last December.

"Trade Follows The Book"

Books are in the advance guard of the Soviet political and economic challenge to the free world. With books go ways of thinking — about government, about education, about management, about science and technology. If these books do their job effectively in the training of those who will become a nation's leaders, they will provide the basis for political and cultural understanding and also, in the future, for trade.

The Russians are not the first to discover this relationship. Britain, which lives by trade, has traditionally exported more of its book production than any other nation. Today it exports one book in every two produced. The British have a favorite dictum: "Trade follows the book." They have proved its accuracy. Now the Russians are trying to make this same principle serve their purposes.

Where does the United States stand in this competition for men's minds? In number of books, it trails far behind the Soviet Union — exporting roughly 20 million books, against the Russians' 30 million. As a proportion of our total output of books, our exports amount to only 10% — against Britain's 50%.

The Russians' Advantage

U.S. book exports have grown in the years since World War II, from approximately $11,000,000 in 1946 to $35,000,000 in 1958 (both figures excluding Canada). But in expanding book exports, the American publishing industry faces two major obstacles:

(1) **The comparatively high cost of producing a book in the United States,** which puts its price well beyond the reach of many students, teachers and businessmen in other countries; and

(2) **The shortage of dollar exchange in many countries,** which means that importers can pay for

books only in currencies that are of little use to American publishers.

The Russians have neither of these problems. Soviet publishing is state-subsidized, and exported books are sold for nominal sums paid in the currencies of the importers. As these books serve the political and economic purposes of the Soviet Union, they are cheerfully sold on giveaway terms.

The American publishing industry, on its own, is making vigorous efforts to increase the distribution of American books in other countries. Leading U.S. publishers and their agents have offices and salesmen in the major countries of Asia, Africa and Latin America. Several publishers have begun to reprint textbooks in Asia at one-half to one-third of their U.S. costs, thus making them available to the students in Asian countries at prices they can more nearly afford. And the American paperback has become a symbol of low cost in popular books. But neither of these devices is practicable for serious cultural, technical, scientific, educational and professional books, which require durable, hard-bound and necessarily expensive editions. Despite their great importance to those who need these books, the demand for them is simply not large enough to warrant low-cost publishing methods.

Government agencies also have increased the availability of American books. The United States Information Agency and the International Cooperation Administration have placed American books in libraries overseas, donated them to educational institutions and presented them to key individuals in the industries and governments of the developing countries of the world. But these programs are small in relation to the need.

A Modest Program

An unusual and little-publicized Government program has helped American publishers overcome the other major obstacle to the export of books — the shortage of dollar exchange. This is the Informational Media Guaranty (IMG) program, administered by the United States Information Agency. It enables publishers of books judged to be worthy of the American way of life to sell their books, for local currency, in countries such as the Philippines, Formosa, Vietnam, Burma, Indonesia, Pakistan, Turkey, Israel, Poland, Yugoslavia, Spain and Chile, which would otherwise be unable to buy these books because of their shortage of U.S. dollar exchange.

The IMG program is not a giveaway. Publishers have to **sell** their books, and customers overseas have to want them enough to **buy** them at full prices. IMG merely guarantees that the exporting publisher receives in dollars the payments he collects from his customers in their currency. The program costs very little in terms of our total foreign aid program, or in terms of what it accomplishes. In ten years it has made possible the sale of $150 million worth of books, magazines and films to countries of key economic and strategic importance at a cost of only $10 million.

The IMG functions through a revolving fund. Foreign currencies are exchanged for dollars, and the foreign currencies in turn are resold to replenish the supply of dollars. The net cost is the small but unavoidable loss on resale of these foreign currencies. Over the ten years of this program, the IMG revolving fund has shrunk from its original $28 million to $18 million, $10 million of which is in unconverted foreign currencies.

If this modest but vitally important program is to be continued, Congress must appropriate the money necessary to rebuild the revolving fund. This would ensure that any country approved by the State Department and willing to sign an agreement to buy American books, at their full price, with its own currency, could do so. Last August, Congress reduced a requested appropriation for this purpose from $7 million to $2½ million. To continue even at its present reduced level, an appropriation of $3½ million is needed. To realize the full potential of IMG, the revolving fund must be restored to its original level.

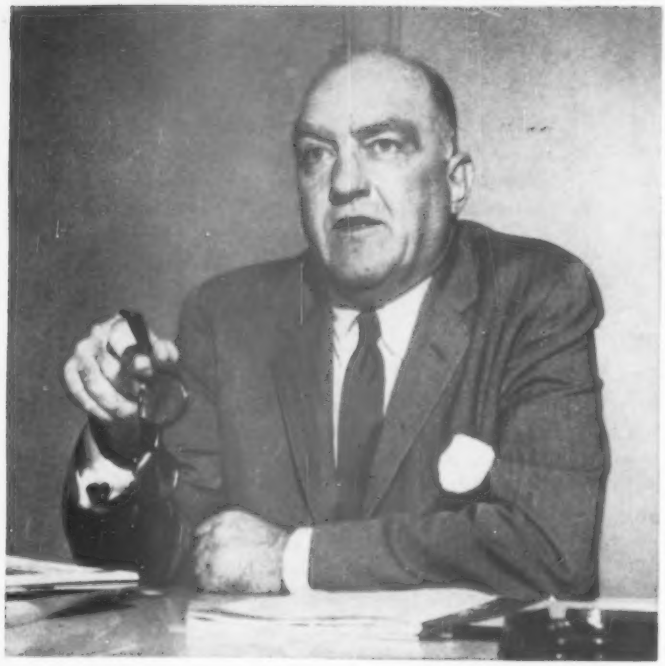
If the IMG program is not continued, with adequate financial support, some countries whose friendship and understanding we seek today and with whom we hope to build a trading partnership in the future will have to reduce their purchases of American books to a trickle. These are countries where school teachers, college professors, students, engineers, doctors and businessmen need and want to buy American books. The loss will be not only theirs, but ours as well. For it will deprive the U.S. of one of its most effective, and least costly, means of communicating knowledge and ideas and understanding of the American way of life.

This message is presented by the McGraw-Hill Publishing Company to help increase public knowledge and understanding of an important national problem. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.



All the Facts

Here's your guide to decision on this growing question. In four parts (Parts 2, 3, and 4 on the following pages) FACTORY brings you the pro's and con's from the men in the know. The answer man in this interview is Alan McCone (photo), Catalytic Construction Company.

How 14 Plant Maintenance Managers

FACTORY asked 14 plant maintenance managers to review the McCone interview, frankly state their reactions. Size of the maintenance forces of these 14 men ranges from 50 to over 400. All 14 rely heavily on contractors in new construction and special maintenance services. Six use CM moderately—for peak loads or special skills—but none in a major way the year around. Of these, one uses CM only for plant building and facilities, not for manufacturing equipment. Another always checks CM bid against his own cost.

The following quotes reflect some of the major opinions of these 14 men. More specific pro and con comments (quotes and extracts) in each area of the interview have been inserted by FACTORY following McCone's answers in the text. These comments will help you analyze the advantages and disadvantages of CM. The two managers who preferred anonymity were generally unsympathetic to CM, yet were counted among the six with minds open to its economic values.

"It will be difficult to build up a cost-conscious maintenance organization with a crew made up of men who are not employees of the parent organization . . . However, building trades union men can be used to supplement regular maintenance forces effectively if they are given specific and well-defined assignments on a single-order basis." *John B. Whitlock, Chief Engineer, Armco Steel Corporation, Middletown, Ohio.*

"There is no doubt that CM has a place in industry, but its application is not as broad as one would be led to believe. It is not a panacea, but a valuable solution to a problem when justified. Each case must be considered on its own merits." *John M. Waligora, Chief Engineer, Merck Sharp & Dohme, Philadelphia.*

"If management has a choice between competitive bidding of CM and its own maintenance organization, it should promote greater efficiency in its own maintenance function." *F. A. Dieter, Superintendent, Plant Engineering, Parke, Davis & Company, Detroit.*

"CM supplies absolutely nothing that energetic, enlightened, and courageous maintenance management cannot supply. In fact, it cannot supply the elements of a good maintenance job nearly so well as such management." *William Duffy, Chief Engineer, Stokes Molded Products, Trenton, N. J.*

"In most of our plants a certain *esprit de corps* exists among our maintenance personnel that we believe would be impossible to attain through CM." *Albert Chapman, Manager, Maintenance Department, Ford Motor Company, Dearborn.*

"CM will be a part of the future of specialization in industry. One obstacle to its faster adoption is the two criteria plant management commonly use to judge performance for salary adjustments: (1) number of people supervised; (2) dollars controlled in the budget. CM obviously decimates the first, should reduce the second if it's worth while." *C. G. Robinson, Works Engineer, New Plant Planning, Westinghouse Electric Corporation, Transformer Division, Sharon, Pa.*

"What can be done by an outside maintenance contractor to achieve optimum results can be had just as well by an equally competent home-owned contractor working

About Contract Maintenance

WHAT'S ALL THIS latest hoop-la about contract maintenance (CM)? What's so new about it? Haven't plants been subcontracting various maintenance chores for years? Should we look into it?

That's what many plants are asking today about CM. To answer, we must first define what we mean by the term. It's not a job contract for construction or modernization of a new plant or facility. It's not a term contract for maintenance and repair services for special equipment, such as elevators, instruments, or air conditioning equipment. And it is not a service contract for periodic cleaning of windows, or one-shot descaling of pipelines, or hiring of a plant protection force.

Then what is CM? Put simply, it's a contract for maintenance craft labor—one or more crafts—to handle a part or all of the regular maintenance manpower needs of a plant. These maintenance men are part of an outside organization—the contractor—similar to workers on a construction or service job. But they are subject to plant supervisory and administrative control.

Perhaps the best known application of CM is at Tidewater's Delaware Refinery, where the entire maintenance program is handled by a contractor—the Catalytic Construction Company of Philadelphia. Here a basic crew of some 200-300 Catalytic men handle all but heavy seasonal workloads. This contract force is temporarily enlarged to whatever size is needed to meet the demands of any major overhaul, such as an oil refinery turnaround.

Is CM for big plants only? When should I consider it? What's good about it? Sounds as if I'd be paying a contractor a profit to do something I can do as well myself. How can it possibly save me any money? These are but a few of scores of questions on the lips of cost-conscious top plant management and the observing maintenance manager.

For answers to these questions, FACTORY went to Alan McCone, (photo at left) assistant to the president of Catalytic Construction Company. Catalytic is the undisputed leader in this type of work. It now handles some 17 contracts for plant maintenance, notably in petroleum and chemical process industries.

Turn the page

Feel About Contract Maintenance

for his salary, his self-respect, his continued renown, and, of course, for his company." *Philip A. Repino, Plant Engineer, Lebanon Steel Foundry, Lebanon, Pa.*

"In a well-managed plant with enlightened labor relations objectives the employees ally themselves with management to make the plant safe, profitable, and a credit to both the company and community. CM workers, despite the very fine approach of Mr. McCone, will still not be a part of the cohesive entity of the plant." *Charles W. Knight, General Superintendent of Manufacturing Services, Monsanto Chemical Company, Plastics Division, Springfield, Mass.*

"Maintenance of complicated equipment specifically designed for a manufacturing operation requires experience that is gained by long service. CM does not provide the essential employee interest factors to promote this long service." *Oscar W. Graveley, Technical Assistant to Works Manager, Union Carbide Metals Company, Niagara Works, Niagara Falls, N.Y.*

"CM lacks a proprietary sense of responsibility on the part of the individual maintenance employee. If such a man, regardless of craft, is assigned responsibility for a specific machine or area, he will soon start talking in terms of 'my machine.' This attitude can do more toward improving maintenance standards than time studies, time standards, incentive pay, and all other classical methods of stimulating people into improving their work habits. I and my associates and subordinates don't believe CM personnel can achieve this climate." *W. E. Fore, Plant Engineer, North American Aviation Inc., Los Angeles.*

"Here is the major need filled by CM: A situation where top management or maintenance management is too weak to go through the labor pains of establishing its own satisfactory organization." *Luther F. Eschner, Plant Engineer, International Resistance Company, Inc., Philadelphia.*

"I am at a loss to see how CM workers with building trade wages, plus the cost of CM engineering, supervision, clerical force, and a profit for the contractor, can compare with our present costs . . . But CM shows many good points that should be considered in the starting of a new plant." *Frank E. Manchester, Superintendent, Central Services, Brown & Sharpe Manufacturing Company, Providence, R.I.*

"If plant management has had no maintenance experience, doesn't try to understand it, doesn't feel it's intimately tied up with the processing or operating function—or if plant management is bored with the problems of maintenance and its intermittent craft jurisdictional squabbles and other human relations matters, which differ so much from the operating personnel problem—then a seemingly simple solution is to use a CM contractor with a few control strings attached. Whether it really is so simple, time alone will tell." *Maintenance manager of a large refinery.*

"Well-managed CM may be an improvement, possibly a dramatic one, over poorly managed internal maintenance. The real solution lies in good internal management. There may be many cases where CM is the best practical answer—each must be analyzed on its merits." *Maintenance manager of a large chemical process plant.*

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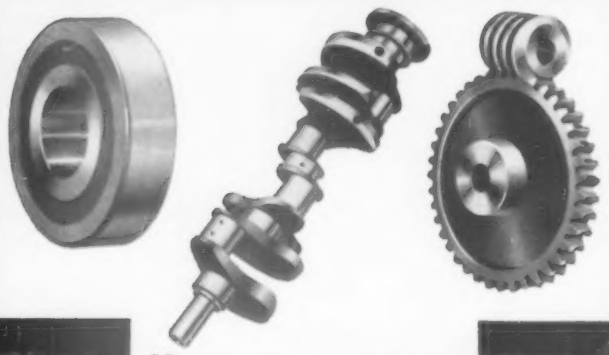

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While CM is simple in concept, we find it intrudes into many areas of plant operating practices and policies. To get a full evaluation of the possible benefits, we became convinced you need to examine all the facets. In our questioning of Alan McCone we often purposely assumed the role of devil's advocate in anticipation of a "show me" reader attitude. What's more, we sent McCone's answers to a score of maintenance managers for comments (pages 170-71) on his views. In the text that follows you'll find FACTORY's questions in heavy black type, McCone's answers in light-face type, and the comments of plant maintenance managers under *"What plant men say."*

So, favorable or unfavorable, here are the answers on CM. You can judge for yourself its value to you.

Who Can Use CM

Is CM (contract maintenance) for big plants only?

No. But the bigger the plant, the bigger the possible savings.

How small a maintenance operation can CM handle?

CM can handle any contract on which a contractor could make a profit. Our lowest contract to date uses about 25 men. I can see using as few as 10 men. In that case, however, the fee would not permit as much central-office management back-up as would a large-plant set-up. It's a business deal that must have economic merit for plant and contractor. The point at which a high-grade, high-paid contract supervisor represents a disproportionate part of the whole cost is a decisive factor. Even then our consulting experience might justify the extra cost through better management. And small plants could draw on outside skills whenever needed.

What plant men say:

• This profit could better be spent by a plant in improving the tone of its maintenance supervision.

Turn the page

For more facts Circle 538 on Reader Service Card

A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

ROUTE TO:
- ☐ ENGINEERING
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- ☐ SALES
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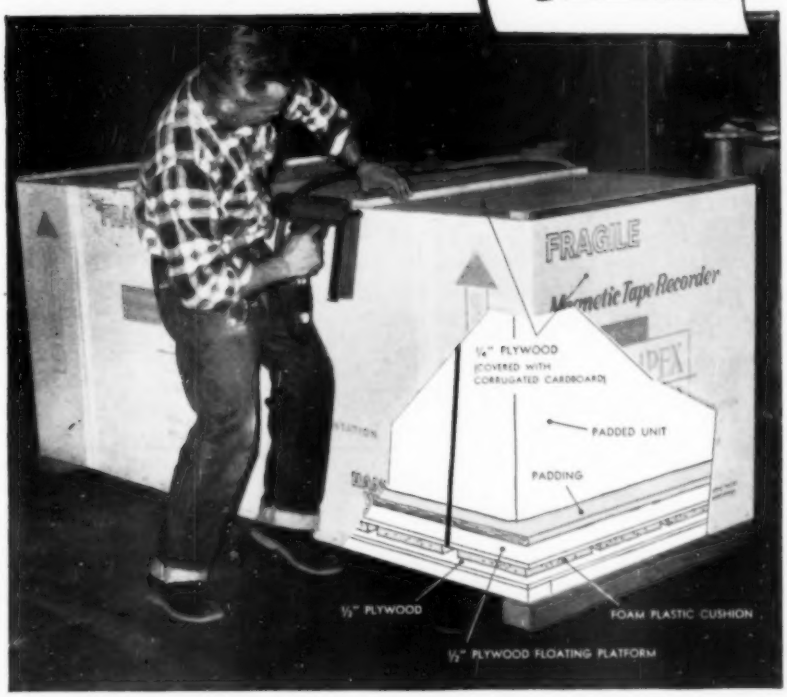
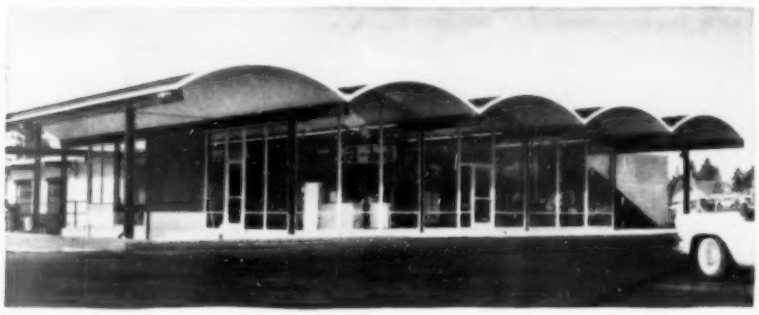


Prize Package—This unique fir plywood shipping container features a free-floating inner floor that virtually eliminates in-transit damage to delicate electronic equipment—yet it costs and weighs only half as much as the bulkier crates it replaces.

Adapted by Ampex Corp., Redwood City, Calif., from a system developed by North American Aviation, the container was an award winner at the packaging competition recently conducted by the Society of Packaging and Materials Handling Engineers.

Termed "free floating suspension" packaging, the system is keyed to a foam plastic-supported fir plywood platform to which the padded lading is securely strapped. Sides, top and bottom of the crate itself are also fir plywood. Plywood construction provides strength and rigidity without the penalty of extra weight, gives maximum impact and puncture resistance, and also simplifies fabrication and assembly.



Fir plywood vaulted roof components helped hold overall construction costs to $8.10 per square foot on this new Redi-Gas office-display-warehouse building in Tacoma, Washington. The multiple arch roof is composed of curved stressed-skin panels (each four feet wide and spanning 16 feet) which combine roof decking, finish ceiling and insulation. In addition to reducing on-site labor by as much as 80 per cent, the curved roof components permit large clear floor areas, spanning 16 feet without supplementary support from purlins or trusses. Each panel consists of Exterior fir plywood top and bottom skins glued to light lumber framing.

Plywood patterns help save hundreds of dollars monthly at Ryan Aeronautical Co. Fir plywood is cut to exact shapes of parts to be obtained from metal sheets and arranged for optimum cutting. Polaroid camera prints are rushed to production crews within minutes after the layout is approved.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

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—an industry-wide organization devoted to research, promotion and quality control

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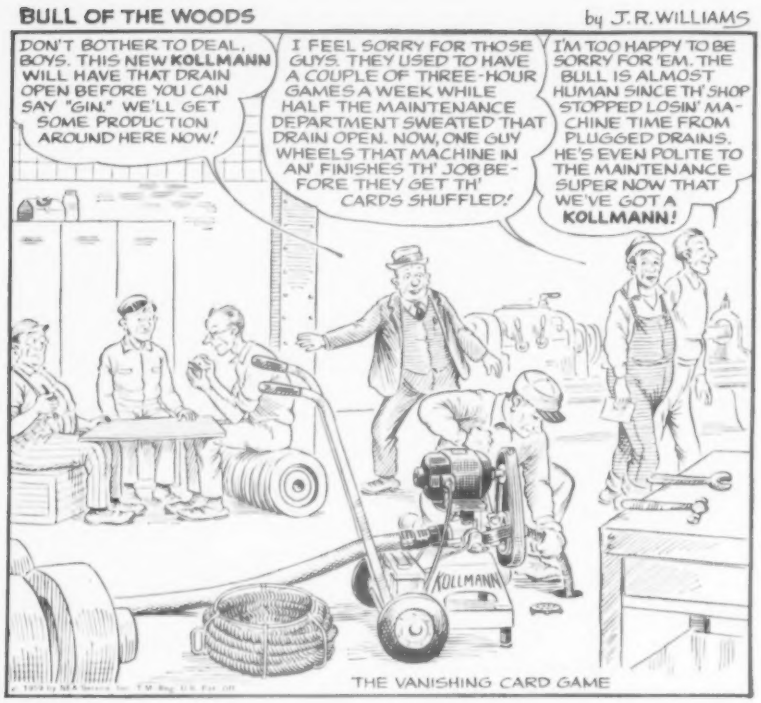
BULL OF THE WOODS
by J. R. WILLIAMS
DON'T BOTHER TO DEAL, BOYS. THIS NEW KOLLMANN WILL HAVE THAT DRAIN OPEN BEFORE YOU CAN SAY "GIN." WE'LL GET SOME PRODUCTION AROUND HERE NOW!
I FEEL SORRY FOR THOSE GUYS. THEY USED TO HAVE A COUPLE OF THREE-HOUR GAMES A WEEK WHILE HALF THE MAINTENANCE DEPARTMENT SWEATED THAT DRAIN OPEN. NOW, ONE GUY WHEELS THAT MACHINE IN AN' FINISHES TH' JOB BE-FORE THEY GET TH' CARDS SHUFFLED!
I'M TOO HAPPY TO BE SORRY FOR 'EM. THE BULL IS ALMOST HUMAN SINCE TH' SHOP STOPPED LOSIN' MA-CHINE TIME FROM PLUGGED DRAINS. HE'S EVEN POLITE TO THE MAINTENANCE SUPER NOW THAT WE'VE GOT A KOLLMANN!
KOLLMANN
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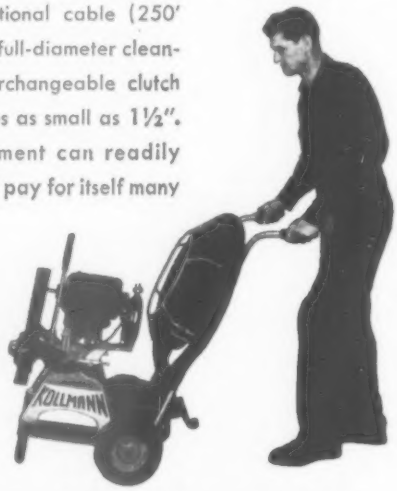
YES, THE KOLLMANN "500" CLEARS *Any* STOPPAGE QUICKLY...THOROUGHLY...

● Designed for industrial use, the "500" makes fast work of stubborn flow line stoppages, eliminates trouble and "down time"... and anyone in the maintenance crew can operate it. The dolly-mounted "500" handles up to 150' of sectional cable (250' with larger power units) for full-diameter cleaning of lines 3" to 10". Interchangeable clutch jaws quickly adapt it to lines as small as 1½". *Every* maintenance department can readily justify this machine... it will pay for itself many times over.



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CONTRACT MAINTENANCE

Begins on page 170

Is CM feasible for any type of manufacturing?

No. In plants with small maintenance needs administrative costs might rule it out.

What plant men say:

• It's unfair to compare a poorly run maintenance organization to anything outside that's allegedly more efficient. Real trouble may be plant policies beyond the maintenance manager's control, poor equipment, or even a poor maintenance head.

• Efficient management is the crux of the whole discussion—and it can be home-grown.

In what areas is CM likely to be most profitable?

Generally, in two areas: (1) any industry where maintenance overhaul peaks (process or basic steel industries) are normal; (2) any industry that has not had good maintenance management. For the first, CM can supply the temporary extra manpower needed. For the second, CM can furnish topnotch maintenance management through its central consulting staff and field supervision, plus a wide range of craft skills.

What plant men say:

• What are the criteria of good maintenance management? This would seem to call for an audit by an external unbiased consultant.

• Contracting peak loads is essential to good internal maintenance management, but in many plants variations can be dampened by judicious use of priorities and planning with little loss in efficiency.

Does this mean CM is applicable to all types of industries?

Yes. Of course, if a plant has stable manpower requirements and good controls and procedures, it might run as well without CM. Most spectacular savings occur in plants with fluctuating loads. But CM can offer substantial benefits in stable plants, too. In one case we halved maintenance costs by higher productivity and no featherbedding. This plant had made costly job-packing con-

A.S.M.E. CODE

When you install a B&G Heat Exchanger, you have assured yourself of not only high efficiency, but highest quality construction.

With each B&G Exchanger, a Manufacturer's Data Report for Unfired Pressure Vessels, Form No. U-1, as required by the provision of the A.S.M.E. Code rules, is furnished. This form is signed by a qualified inspector, holding a National Board Commission, certifying that construction conforms to the latest A.S.M.E. Code for unfired pressure vessels. The A.S.M.E. "U" symbol is stamped on each exchanger.

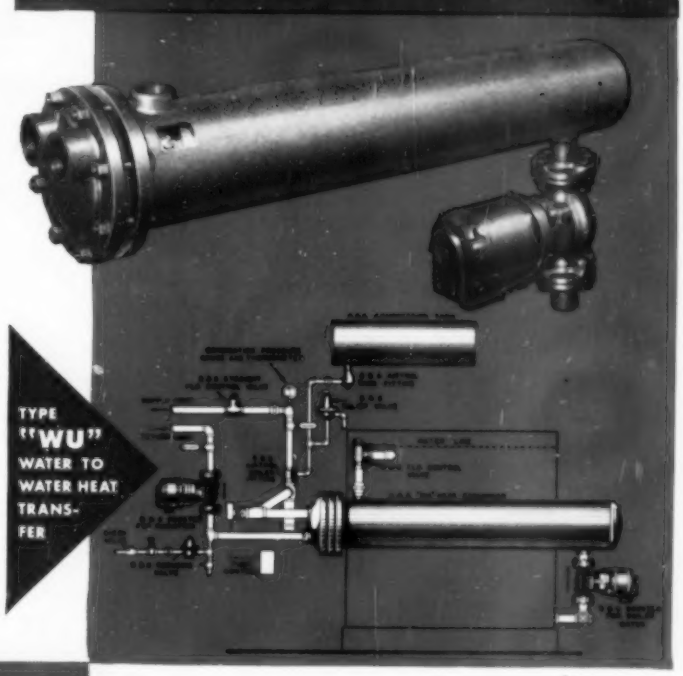
TYPE "WU"

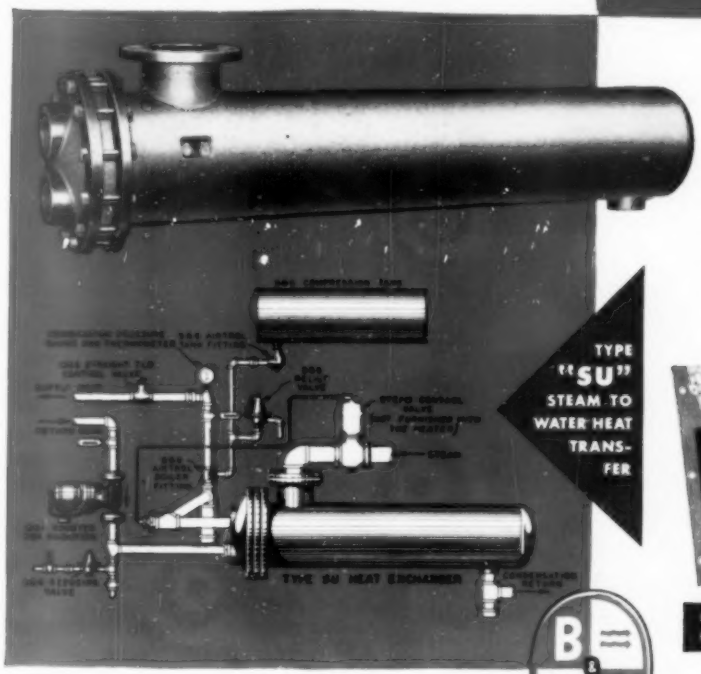
The "WU" Exchanger is equipped with a B&G Booster which pumps boiler water through the shell, greatly increasing the capacity of the unit. An unbelievably small "WU" produces large volumes of hot water. Water temperature is closely controlled... the Booster starts whenever the water goes below the desired degree and continues to run until the water is again at the proper temperature.

When used as a service water heater, a storage tank can be eliminated, because the "WU" heats water as rapidly as it is used.

Heat Exchangers

FOR RADIATION AND WATER HEATING





TYPE "SU"

In buildings where steam is required for process use, the advantages of a forced hot water heating system can be obtained by installing an "SU" Exchanger instead of an extra boiler.

This exchanger also provides an efficient, low cost method of heating water for apartments, hotels, hospitals, industrial and processing plants. No storage tank is needed.

For complete information send for "WU" Catalog No. GC-1054 and "SU" Catalogs No. SC-159 and SI-159.

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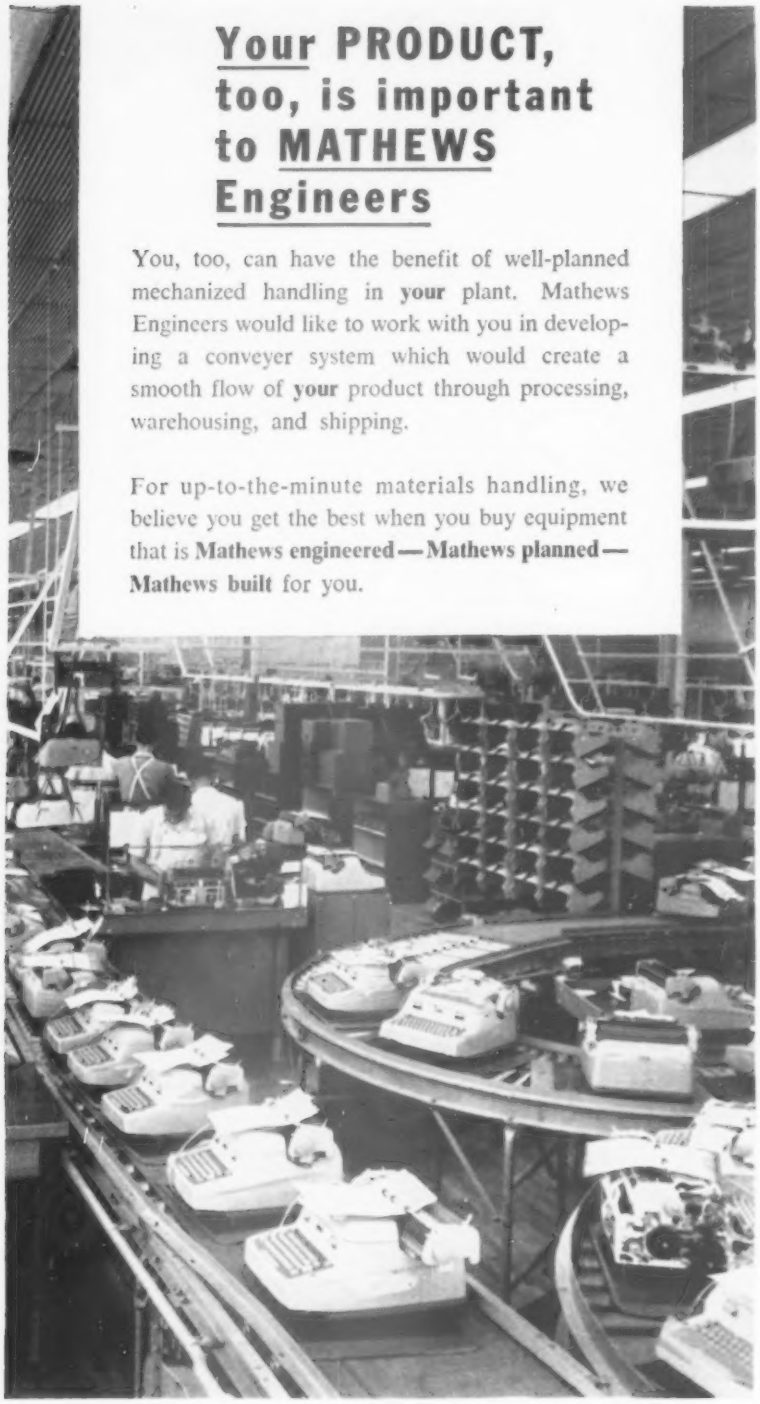

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You, too, can have the benefit of well-planned mechanized handling in **your** plant. Mathews Engineers would like to work with you in developing a conveyer system which would create a smooth flow of **your** product through processing, warehousing, and shipping.

For up-to-the-minute materials handling, we believe you get the best when you buy equipment that is **Mathews engineered—Mathews planned—Mathews built** for you.

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MATHEWS

Over Fifty Years of Leadership in Mechanized Handling

Begins on page 170

cessions such as foreman-to-worker ratios, fixed crews for certain assignments, arbitrary standby. Such local practices don't exist in our international union agreements.

What plant men say:

- It's easier to transform poor maintenance operation into good management than to displace an existing organization with CM.
- Our CIO featherbedding is small compared to what CM with its AFL set-up provides.

What CM Is

What kind of work does CM handle?

Speaking for Catalytic, we are not interested in the spasmodic or periodic services that are supplied by local and national service organizations for specific types of equipment or facilities. We do solicit plant-wide maintenance work involving upkeep, repair, replacement, alterations, and minor improvements. No major construction. We are not brokers for skilled labor and we do not act as a "hiring hall."

What is the period of a contract?

One year. But this is only to fix terms. The plant can ask us to vacate overnight, and be obligated only for normal contract termination costs. In some cases we've agreed to a six-months' termination notice on our part. Our labor force is always on a day-by-day basis.

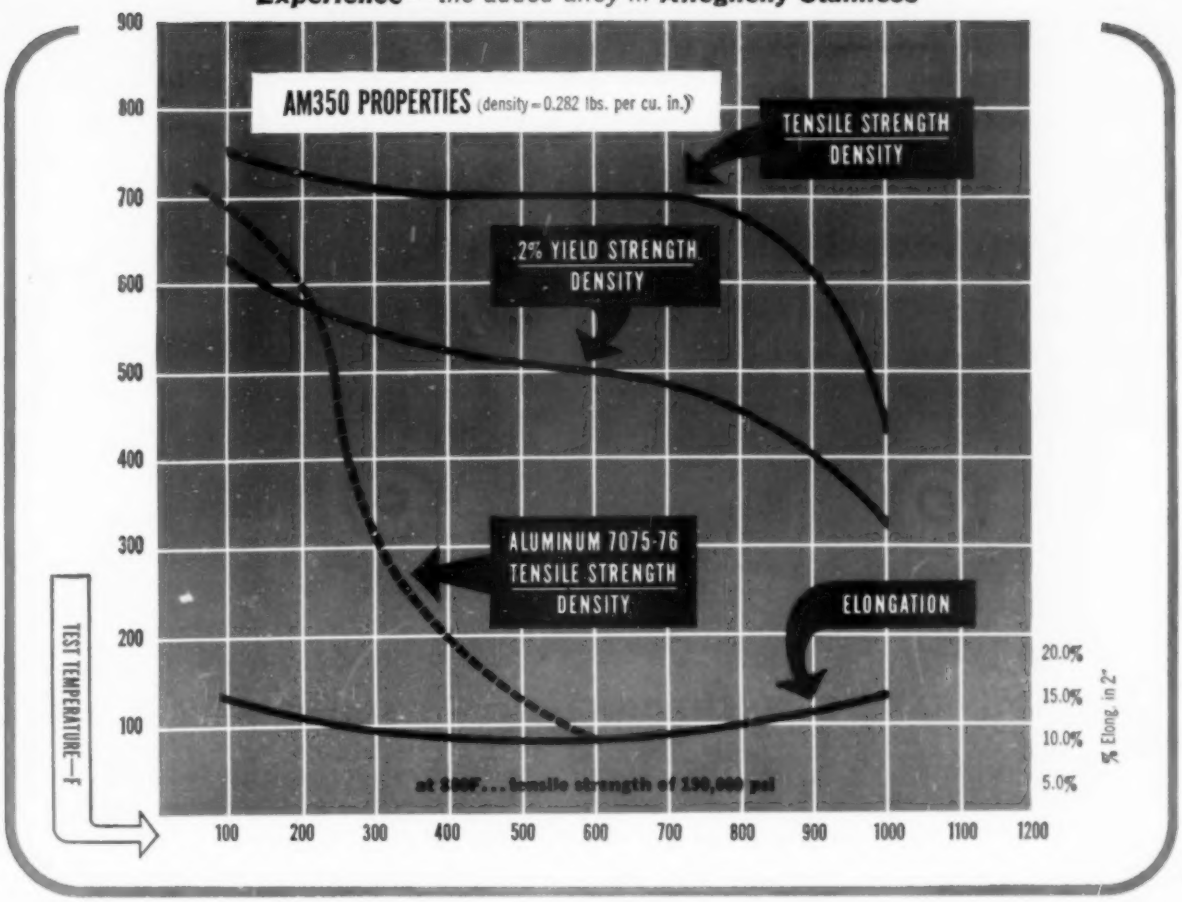
How do you get good tradesmen to work on a day-by-day basis?

We draw from the building trades unions. They work on that basis. They can cover any needs met by industrial crafts. We have negotiated a nation-wide agreement with all trade or craft unions needed for maintenance. It established uniform conditions, excluding wages.

What plant men say:

- We question the qualifications of CM men in skilled trades. Judging from quality of work on our own construction contracts we couldn't use machinists, millwrights, instru-

Experience — *the added alloy in* **Allegheny Stainless**



Two for the space age—AL's AM-350 and AM-355 precipitation hardening steels

A unique combination of highly desirable properties describes Allegheny Stainless AM-350 and AM-355 Steels. They combine high strength at both room and elevated temperatures, excellent corrosion resistance, ease of fabrication, low temperature heat treatment, good resistance to stress corrosion.

They are proving the answer to many space age problems. Airframe and other structural parts, pressure tanks, power plant components, high pressure ducting, etc. are all natural missile and supersonic aircraft applications for AM-350 and AM-355.

AVAILABILITY: AM-350, introduced several years ago, is available commercially in sheet, strip, foil, small bars and wire. AM-355, best suited for heavier sections, is available commercially in forgings, forging billets, plates, bars and wire.

CORROSION RESISTANCE: Compared to the more familiar stainless grades, AM-350 and AM-355 resist corrosion and oxidation better than the hardenable grades (chromium martensitic) and only slightly less than the 18 and 8's. They resist stress corrosion at much higher strength levels than do martensitic stainless grades.

SIMPLE HEAT TREATMENT: High strength is developed by two methods. Both minimize oxidation and distortion problems. The usual is the Allegheny Ludlum-developed sub-zero cooling and tempering (SCT): minus 100F for 3 hrs plus 3 hrs at 850F. Alternate method is Double Aged (DA): 2 hrs at 1375F plus 2 hrs at 850F.

EASY FABRICATION: AM-350 and AM-355 can be spun, drawn, formed, machined and welded using normal stainless procedures. In the hardened conditions, some forming may be done . . . 180 degree bend over a 3T radius pin. Also AM-350 can be dimpled in the SCT condition to insure accurate fit-up.

For further information, see your A-L sales engineer or write for the booklet "Engineering Properties, AM-350 and AM-355." *Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa. Address F-19.*

WSW 7816

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Example of Wash and Shower room floor layout

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Bradley Washfountains provide maximum facilities in less space with minimum amount of piping connections. Each 20-in. of rim equals one lavatory.

Wall type semi-circular models provide same advantages—foot-control, deep self-flushing bowl.

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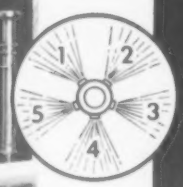
Bradley Columns each provide for 5 persons with individual control of water volume and temperature. Three heights; 6', 5'6", and 5'



Bradley Showers also can be provided with stall-separating panels and curtains for greater privacy. Unit shown above is a 3-person shower located near wall.

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Write today for Catalog 5601.

CONTRACT MAINTENANCE

Begins on page 170

ment repairmen. Welders, electricians, pipefitters can also be weak.

• This day-by-day procedure is not attractive to qualified workmen. The less capable men constantly recirculate through union hiring halls.

Where do you get your management staff—superintendents, field supervisors, engineers, project managers, planners, and coordinators?

From the same sources industry uses. A few of them (hourly wage-roll first-line supervisors) are BT (building trades) men who have been with us for some time and realize the difference between construction and maintenance. Higher supervision (Catalytic salaried men) are competent experienced men from industrial and utility ranks. They are educated in contract maintenance and its main objective, namely, a service organization to give the client minimum costs.

What plant men say:

• A plant must retain enough of its own supervisory personnel to supervise the contract, guarantee the feedback and analysis essential to improving equipment and process.

• It's reasonable to assume that supervision by the contractor's men (generally union men) is not of the caliber of supervision by plant men (generally salaried.)

• There's no reason a good plant maintenance superintendent can't get good supervisors on his force.

• A CM foreman with a union card is probably not management-oriented or company-minded—he's job-minded.

Must a plant contract its maintenance on an all-or-none basis?

No. A plant may contract for any part or any degree of maintenance it wants. My company offers three main types of services: (1) a periodic job, (2) continuing supplemental maintenance force, and (3) entire maintenance management.

For a one-shot or periodic job, the contractor also furnishes field supervisors and others that may be required or requested, such as planners, engineers, and inspectors.

Turn to page 183

For more facts Circle 544 on Reader Service Card

For more facts Circle 545 on Reader Service Card ➤

TEXACO ORGANIZED LUBRICATION CAN HELP YOU...

Get rid of the "guns" that "misfire"

His grease guns are aimed at your profits: they can help boost them — or eliminate them altogether. Here's why:

You used to need a different grease for nearly every job. That meant 20 or 30 lubricants in the plant, with the almost inevitable danger of misapplication — and damaged machinery.

Unless you're operating on the basis of a modern lubrication survey, *the chances are that this situation still exists in your plant!*

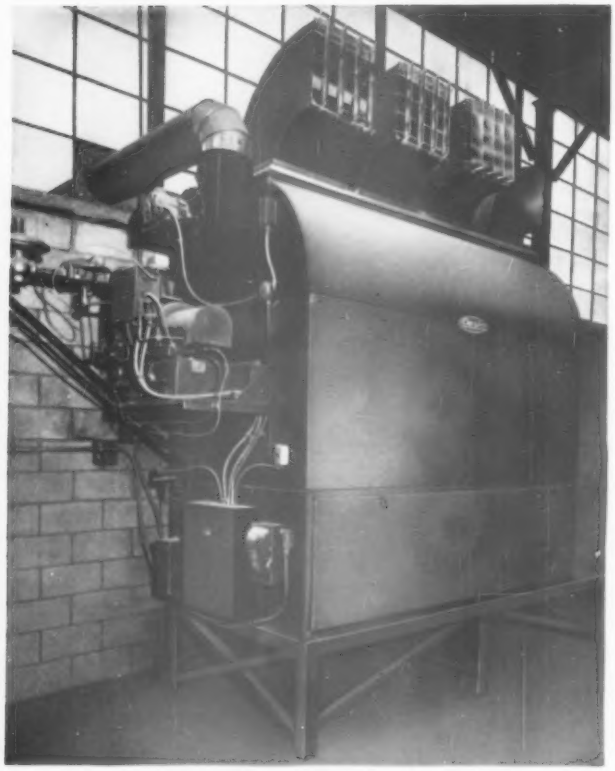
A Texaco Organized Lubrication Plan uses a minimum number of proper oils and greases — including newly developed multi-purpose lubricants — to reduce your inventory by as much as 80% and virtually eliminate this problem.

Get the details on Texaco Organized Lubrication. Contact your local Texaco Lubrication Engineer or write for "Management Practices that Control Costs via Organized Lubrication."

The Texas Company, 135 East 42nd Street, New York 17, N. Y., Dept. F-102.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

Boat builder gets low-cost comfort with Carrier Heat Diffuser–Direct-Fired



If your problem is finding the best way to heat a large area at low cost, here's what Owens Yacht Corporation's Cutter Boat Co. subsidiary did.

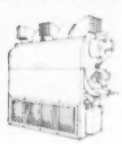
To heat 70,000 square feet of new plant space, Cutter Boat installed two Carrier Heat Diffusers—Direct-Fired to provide 3,000,000 Btus. Both are fired by natural gas. One is used for heating only, the other for heating and ventilating.

Completely self-contained Carrier Heat Diffusers—Direct-Fired, heat or heat and ventilate factories, warehouses and other large buildings at minimum cost. They can be floor-mounted or suspended from wall or ceiling—wherever you have space. You need no special foundations or extra rooms. They heat immediate areas or they can be fitted with ducts to heat other sections.

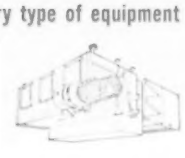
You'll be sure of top fuel economy with any gas or light or heavy oil. Carrier's "Big Circle" heavy-gauge stainless steel combustion chamber and modern design assure utmost combustion efficiency. Unit sizes range from 300,000 to 2,000,000 Btu hr.

For facts on low-cost heating of large areas with Carrier Heat Diffusers—Direct-Fired, call your Carrier Unit Heater Agent or Wholesaler. He's listed in the Yellow Pages under "Heaters—Unit," or write to Carrier Corporation, Syracuse, New York.

Carrier offers every type of equipment for any commercial or industrial job



Heat Diffusers – Direct-Fired for all types of fuel



Heat Diffusers for steam and hot water

Unit Heaters for steam and hot water

Gas Unit Heaters and Duct Furnaces

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AIR CONDITIONING
REFRIGERATION
HEATING
VENTILATING

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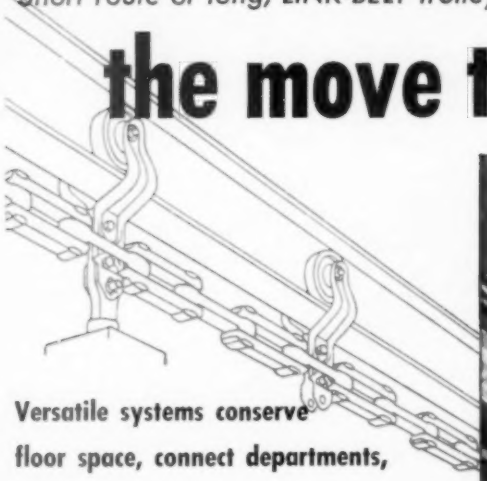
Short route or long, LINK-BELT trolley conveyors trim costs in

the move to modernization

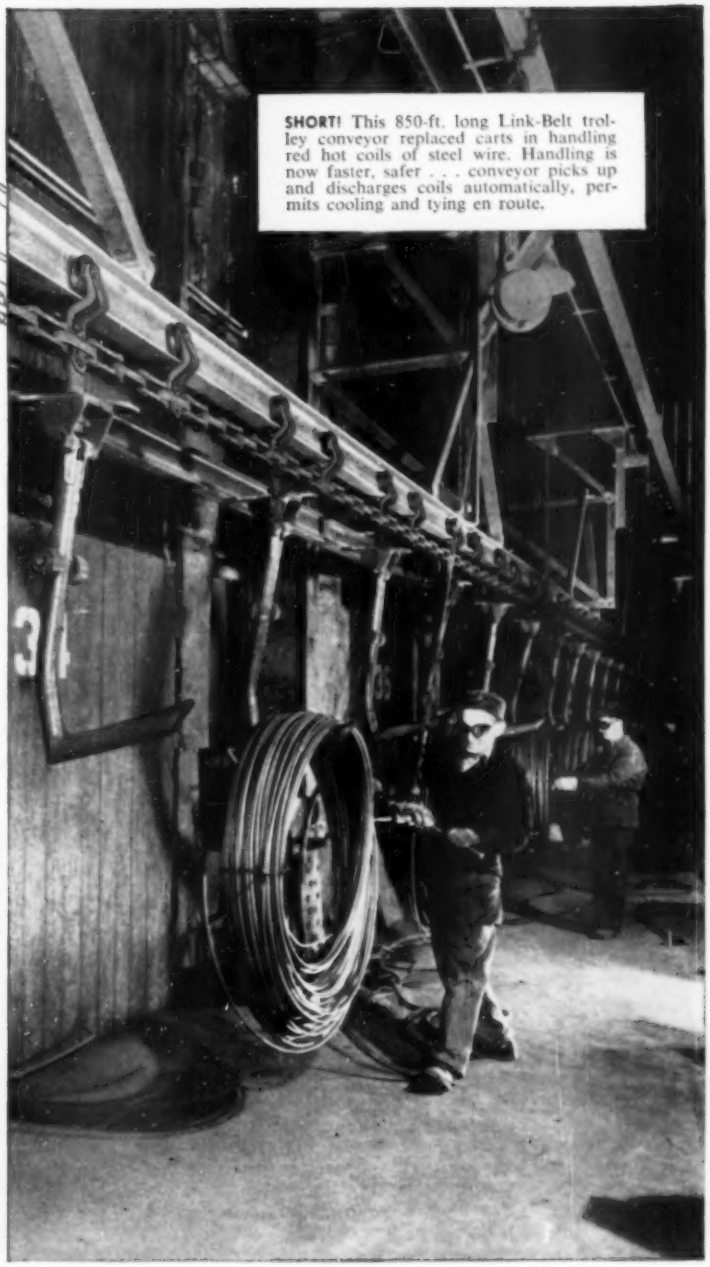


Versatile systems conserve floor space, connect departments, coordinate processing

IN industry's move to modernization, Link-Belt trolley conveyors fulfill many basic objectives. In fact, few conveying methods affect production economics in so many ways, or so significantly.

They exploit otherwise unusable space, converting it to storage and traffic uses. They minimize manual work, prevent damage to the product. Resulting cost savings and production increases are seldom less than spectacular.

You can learn more about the versatility of Link-Belt trolley conveyors by contacting your nearest Link-Belt office. The experience gained from hundreds of installations will provide quick answers to any problems you have. Ask, too, for Book 2330 . . . containing trolley conveyor application and feature data.



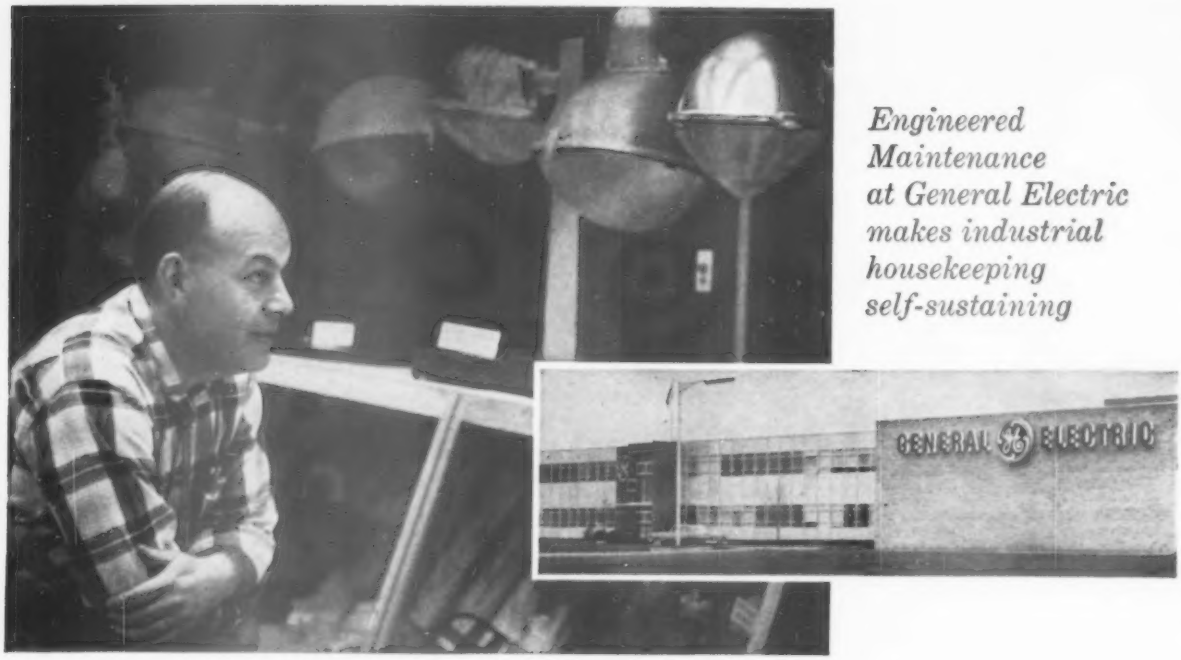
SHORT! This 850-ft. long Link-Belt trolley conveyor replaced carts in handling red hot coils of steel wire. Handling is now faster, safer . . . conveyor picks up and discharges coils automatically, permits cooling and tying en route.

LONG! Twenty-one miles of Link-Belt trolley conveyors coordinate complex assembly operations at this appliance manufacturing plant. The integrated system prevents damage from excessive handling, conserves manpower for more productive work.

LINK-BELT

TROLLEY CONVEYORS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,128



Engineered Maintenance at General Electric makes industrial housekeeping self-sustaining

"Now our sanitary maintenance program no longer demands continuing supervision and scheduling"

"Puritan's ENGINEERED MAINTENANCE has practically eliminated the need for constant checking of our custodians' work, thus freeing management for other important maintenance and production functions."

Ralph F. Fiske, Supervisor of Plant Facilities Engineering at General Electric's Outdoor Lighting Department, Hendersonville, North Carolina, also states:

"In what has come to be known as 'the outdoor lighting center of the world,' ENGINEERED MAINTENANCE provides a comfortable, safe, and efficient working atmosphere... another example of the fact that at General Electric, 'Progress is our most important product'."

How Engineered Maintenance works

You receive a complete, individually planned program, based on a personal inspection of your plant, and prepared by professional engineers. The program is set up to meet the exact requirements of your company. Your custodians' work is organized. You are provided with a system of automatic controls. You are certain of continuing follow-through and review, not only by members of your organization, but by Puritan trained service representatives as well.

Why it is so important

In these days of increasing operating costs, more efficient sanitary maintenance is the logical way to protect your company's investment in plant, equipment, and higher pay scales. Management appreciates this... and Engineered Maintenance provides you with a new and tested solution, without requiring you to ask for a larger budget.

Engineered Maintenance is available as a service — without charge to you!

Puritan will inspect your plant, review your present sanitary maintenance procedures, submit and help install an individually planned Engineered Maintenance Program for your company. As a user of Puritan Sanitary Maintenance products you receive this service free.

Puritan products are nationally used, competitively priced, fully guaranteed. You do not pay a premium of any kind for either your Engineered Maintenance Program or for any Puritan product. You are not involved in any long-term contract. The burden of proof is upon us.

New booklet gives more detailed explanation

Write for "Engineered Maintenance." This new technical brochure explains the Puritan program fully... shows how it will help your company... how it will save your time.

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PURITAN CHEMICAL COMPANY

EXECUTIVE OFFICES: 916 ASHBY STREET, N. W. • ATLANTA 18, GEORGIA

PLANTS & WAREHOUSES: ATLANTA, GEORGIA • HOUSTON, TEXAS • ST. LOUIS, MISSOURI

For more facts Circle 548 on Reader Service Card

For a continuing supplemental workforce the contractor "permanently" augments the plant workforce with workers. With these he also supplies either a combination superintendent-planner for a small force or individual planners for a large force. Also with other services, such as inspectors and engineers. In this he expands or takes up the slack in man-hour requirements as daily or seasonal conditions demand. The plant staff handles all maintenance management functions.

Finally, where the entire management of maintenance is under contract, the contractor furnishes all personnel workers, field supervision, and management. The plant furnishes only enough staff to coordinate the needs of plant management and operating people with the contractor's management personnel.

What plant men say:

- The more CM personnel you have on the job, the more carefully you have to inspect the quality of work—alloy welding, for example.
- Most economical set-up is to have your own skilled maintenance force for day-to-day running maintenance. You can then augment these with CM men for peak loads, using your own men temporarily as lead men, pushers, and foremen.

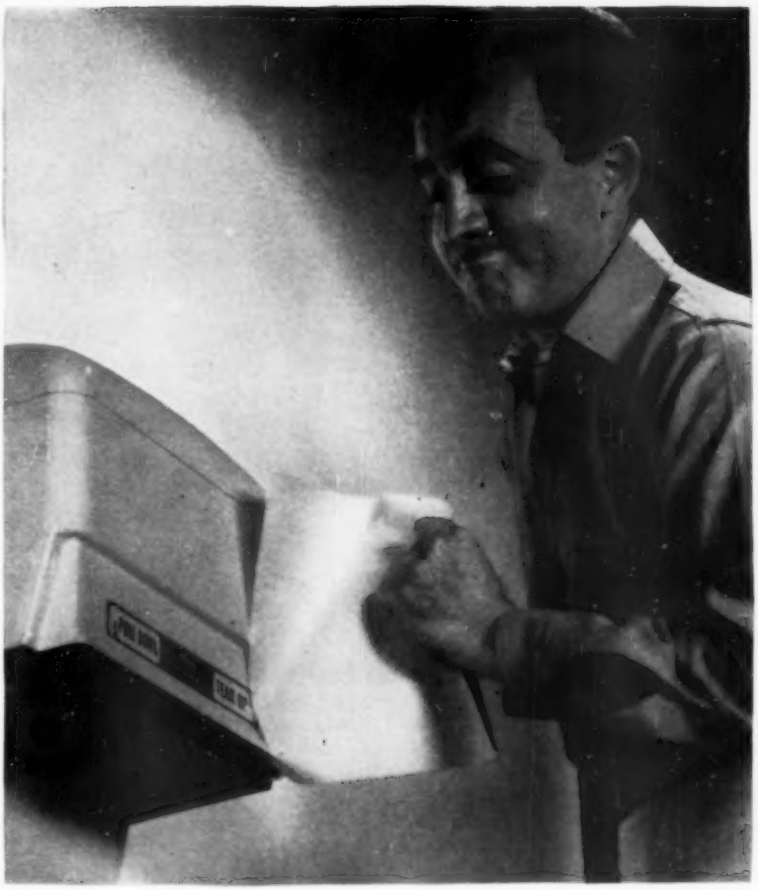
What about drawings, tools, materials? Does the contractor handle these under a full maintenance management contract?

As a rule, we begin with an authorized job request from plant operating people. If drawings are needed, they accompany the job order. If the client requests engineers and draftsmen for a job, they will be supplied along with any other services requested. A contract can include petty tools. But large tools or equipment, such as cranes, are furnished on a rental basis only as needed. As a rule, the plant buys all materials—and we prefer it so.

What plant men say:

- Looks like the plant staff still has to do all plant engineering, storeroom, and clerical work.

Turn the page



With Steiner controlled towels

He's helping cut waste 20%

Paper towel expenses getting high? You can cut towel waste with a Steiner controlled roll paper towel dispenser. Here's how: User pulls from the cabinet only the amount of toweling he needs . . . no grabbing of a handful of towels that aren't needed, half used and then discarded. Still, user gets plenty of towels for thorough drying job. You can save 20% or more in towel costs with Steiner controlled dispensers.

Install them on a trial basis and see how you save. For more information contact your janitorial supplier or sanitary paper distributor or write Steiner Company, 740 Rush Street, Chicago 11, Illinois.

STEINER

STEINER COMPANY
740 RUSH STREET, CHICAGO 11, ILL., DEPT. B-7

Please send me free bulletins on Steiner controlled roll paper towel dispensers.

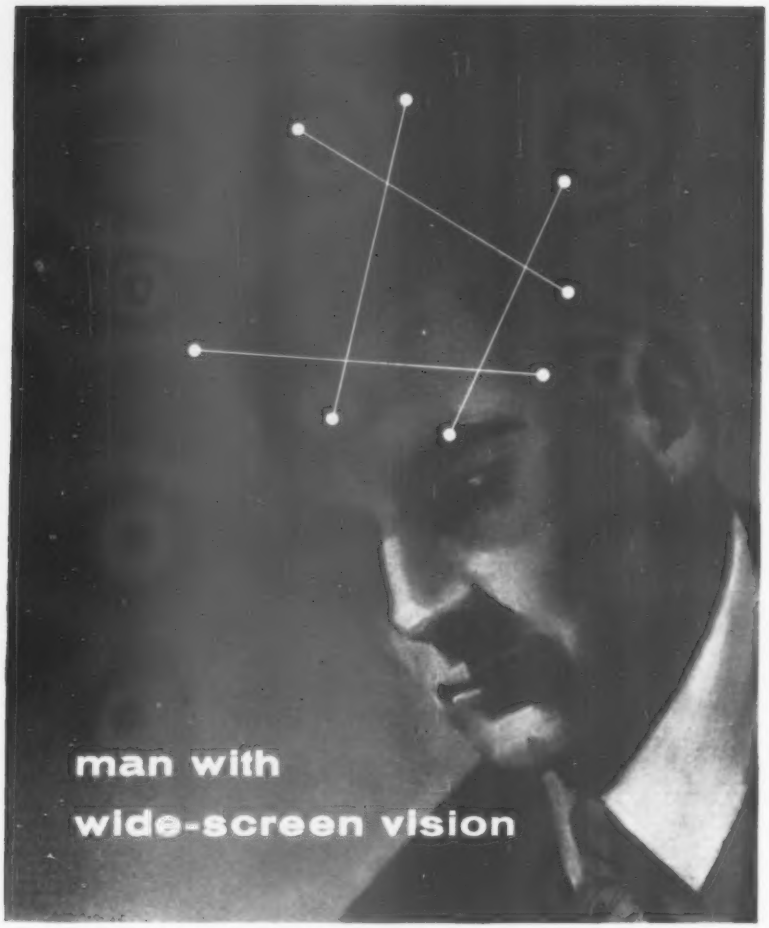
NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

For more facts Circle 549 on Reader Service Card



"The Man from Logan" has had years of vital personal experience in solving conveyor problems for busy plants like yours. So when he turns down the house lights, so to speak, and gives your problem the first screening, he sees it real and sees it whole.

This wide-screen vision is your ultimate assurance of the one best custom engineered conveyor system at the lowest feasible cost. Behind it, of course, is a solid academic engineering background and the special training and equipment to focus two generations of Logan experience directly on your job. Through "The Man from Logan" you benefit from a progressive research and development staff and an eminently qualified home-office engineering force, as well.

He sees your system through from design and specifications to smooth operation. The man and the company—there is no better source for your conveyor. Write or phone for a visit from "The Man from Logan."

Logan Conveyors

LOGAN CO., 510 CABEL ST., LOUISVILLE 6, KY.

CONTRACT MAINTENANCE

Begins on page 170

Can a plant call on your services in an emergency shutdown?

Yes. We handle "one-shot" contracts. But the ordinary contract terms can't apply. We can offer any services that may be required.

Can CM handle a preventive maintenance program?

Certainly. In one of our contracts 70% of the workload is preventive maintenance.

What plant men say:

• The tremendous complexity and diversity of utilities, machinery, and equipment in our plant makes area familiarity with such items mandatory right down to worker level.

How many contractors do you know of in the CM field?

There are many small organizations that handle supplemental maintenance for one or more crafts—electrical, millwrighting, pipefitting. Then there are larger organizations that limit themselves territorially to full maintenance of one or more plants. Other companies in restricted areas offer specific job contracts, as for petroleum turnarounds.

Many members of the National Constructors Association are in a position to secure the maintenance agreement with the building trades. Up to now we know of no member who does complete maintenance and has a maintenance-management contract like ours with Tidewater (Delaware City), or with Goodyear Tire & Rubber (Apple Grove, W. Va.), St. Lawrence Cement (Clarkson, Ontario), and others.

How CM Works

Does a company abdicate records and controls in the full maintenance-management plan? Are detailed cost records and equipment histories available? Or is the maintenance manager out on a limb as to records if the contract is terminated?

It's the company's option to decide on the set-up for controlling records

For more facts Circle 550 on Reader Service Card

For more facts Circle 551 on Reader Service Card ➤

Why Hunter Packing Company uses STANOIL Industrial Oil

Two reasons: (1) STANOIL is a superior oil. (2) Along with STANOIL, Hunter Packing receives experienced lubrication technical service.

A special antioxidant in STANOIL gives the oil resistance to *chemical* change. Deposits are minimized. The oil has a high viscosity index, is resistant to *temperature* change. It lubricates effectively at both high and low temperatures. Due to special refining techniques, STANOIL will not readily emulsify. A special additive minimizes foaming. STANOIL has a low pour point. It flows freely at low temperatures. A rust inhibitor in STANOIL "plates out" on metal surfaces.

W. P. "Sandy" Wehking, the Standard Oil man who calls on Hunter Packing Company, has plenty of experience in technical service work. He's been at it for 17 years. Sandy studied chemistry at Blackburn College. He has also completed the Standard Oil Sales Engineering School.

To get more information about STANOIL Industrial Oil and to obtain technical help on your lubrication problems, call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write, **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

Quick facts about
STANOIL Industrial Oil

- Antioxidant gives oil resistance to chemical change, minimizes deposits.
- Inhibitor "plates out" on metal surfaces, prevents corrosion.
- Receives special refining to eliminate emulsion problems. Contains additive to minimize foaming.
- High viscosity index. Resists temperature change.

You expect more from **STANDARD** *and you get it!*

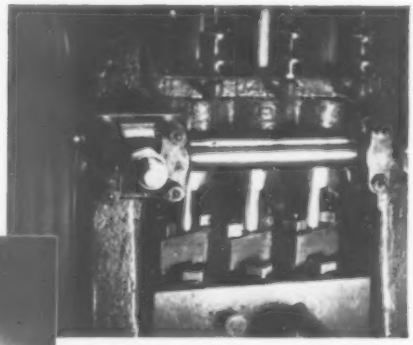
Temperature check. Frank Persson of Hunter Packing Company and Standard Oil lubrication specialist W. P. "Sandy" Wehking inspect one of four compressors in Hunter plant that uses STANOIL Industrial Oil.

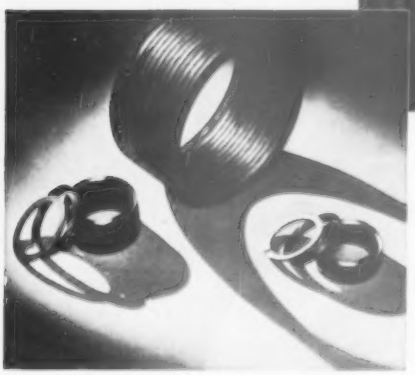
PACKINGS...
for Long-Service Savings

"LONG-LIFE" RED SHEET

For packing flanges and other parallel surfaces in service against hot and cold water, air, saturated steam pressures up to 150 lbs., and all hydraulic applications. Pliable, strong and firm to hold required pressures.

Thicknesses: 1/32", 1/16", 3/32", 1/8", 3/16", 1/4". Max. Width: 48"





"LONG-LIFE" MOLDED-LIP AND O-RING PACKINGS...

FOR AIR, GAS, OIL, CHEMICALS, STEAM, WATER, SOLVENTS

"If it's GOODALL, it MUST be Good!"

Contact Our Nearest Branch for Details and Prices

Standard of Quality—Since 1870

HOSE • BELTING • FOOTWEAR • CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.

BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES. IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

Begins on page 170

and reports. We give it whatever it asks for. Our philosophy is not "We'll take care of your plant the way we decide." We submit to whatever degree of controls the company wants. We go over requirements with company management and recommend procedures. But the company decides how little or how much.

What plant men say:

• CM would not ease our problem of scheduling and timing of production downtime to perform maintenance or make repairs. This calls for good planning by supervision.

How do you define your philosophy of work control?

An authorized work request for every job, which is then analyzed in terms of manpower, materials, money, and time. All this is planned and scheduled as to where, when, and how the work will be performed. Daily costs on each work request are submitted so that the per cent ratio of total expended hours over estimated is compared to the daily per cent completion factor for each job. Significant deviations are analyzed and corrected daily. It's our belief that foremen and supervisors are management's best sources for predicting or demanding output of maintenance labor.

Doesn't this involve a lot of expensive paperwork?

Not when you take an over-all view of what it accomplishes. In a properly administered program it doesn't take long to fill out a well-designed form for even a small work order. We know it pays to control all jobs, whether repetitive or non-recurring. Routine and repetitive jobs can be handled efficiently as a group. And we find that non-recurring jobs involving as little as one hour of work need detailed attention. The cost of planning and estimating the job, setting it up on a master schedule, and providing tools and materials on time is far less than the cost of dragging out a one-hour job into an all-day job for lack of paperwork. This is the key to control of costs.

Turn the page

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Missile on casters. Nike-Hercules near end of final assembly line, as specialists install cable for guidance system at plant.

Casters give important savings in all industry and business

Following the lead of heavy industry, many light industrial firms, warehouses, and even retailers are finding reduced operating costs via streamlined materials-handling.

Casters have kept pace. Recent Bassick developments in addition to the H68 casters shown below include:

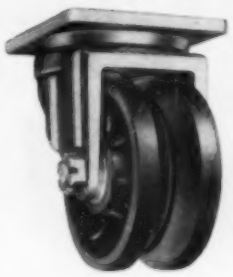
A light duty Floating Hub caster with a shock-absorbing, spring-controlled wheel designed to accommodate loads from 50 to 150 pounds. The "B-Line" of 4", 5" and 6" sanitary casters designed for easy cleaning. These are ideal for use in food processing, bottling plants, restaurants, bakeries . . . anywhere cleanliness is important.

Medium light duty Series H68 casters with two level ball bearing swivels, are ideal for industrial, warehouse and store applications. All exposed metal surfaces are zinc plated. Long service life.

Distributors Stock Casters

Local industrial distributors who handle Bassick casters carry most popular models in stock, can deliver promptly. They can recommend the most efficient casters for your specific job. And where necessary, they may call in a factory representative for engineering recommendations or special caster designs. All of which makes your local Bassick distributor a handy man to know. 9.37

CASTERS AID AUTOMATION OF MATERIALS-HANDLING



For inverted angle iron tracks: Bassick grooved wheel casters effect amazing reductions in handling costs. Light, medium, heavy and super-heavy duty models.

For heavy duty dragline truck systems: Bassick Series "S99" casters combine the advantages of strength (heavy gauge steel) with light weight and economy. Sealed bearings optional.

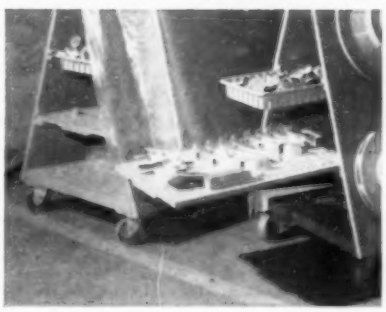
On display at the Materials-Handling Industry's Triennial Convention in Cleveland, this year, will be in-floor dragline systems, overhead chain belt pulleys, tractor pulled truck trains, monorail and dual track set-ups.

These and other advances toward the automation of materials-handling are increasing throughout heavy industry. Here labor traditionally accounts for the bulk of operating costs and labor-saving devices are constantly being sought.

Casters that can take relatively high speeds and abuse of such power-pulled applications have also been developed over the years. Shown here are some of the specially designed Bassick casters with features that suit them for automatic and semi-automatic handling systems. Because of their widespread acceptance, these are now standard casters in Bassick's line and are available through local industrial distributors who handle Bassick casters.

For power-drawn truck trains: Bassick Trailer Duty casters with heavy duty semi-steel or Bassick "On-core" wheels (shown) will take the abuse of rough floors, high speeds. Milspec and "Floating Hub" models also available.

Rocket parts on castered carts save handling time, money



At this California aircraft plant, "A" frame carts, riding on Bassick casters, bring rocket turbo pump parts to the job. Top plastic shelf alone holds 100 small parts, larger components hang from sides of the cart on metal pegs.

Time saving here over separate handling of 150 components is tremendous. Parts carts on casters might cut costs for your plant, too.

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

Sweet's

Symbol of SW Excellence
Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

For more facts Circle 553 on Reader Service Card

NEW TRANSPORTER IN TWO SIZES

1000 lb. & 4000 lb. CAPACITIES

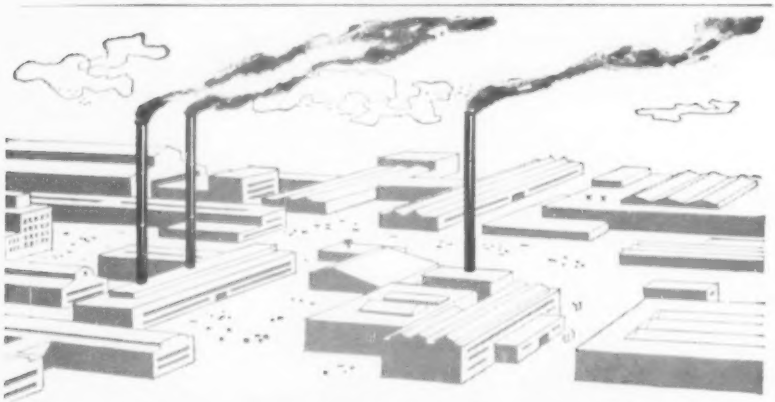
MODEL F-40 Torque converter drive. No shifting, smooth starts. This is a big rugged 4000 lb. capacity unit that delivers heavy duty service as a freight carrier, shuttle truck, long stock transporter, and to give mobility to equipment and personnel. 28 sq. ft. deck area.

PRIME-MOVER

Prime-Mover transporters are marketed by industrial truck distributors. Ask there -or write: Prime-Mover Co., Muscatine, Iowa.

MODEL F-10 A 1000 lb. capacity truck. Carries cartons, long stock, mixed freight, maintenance supplies, baggage, fire equipment. Ideal for foremen, superintendents, inspectors, supervisors. 18 sq. ft. deck area. Wisconsin engine. Industrial type combination transmission. Price: $880 manual start; $996 electric start. F.O.B. Muscatine, Iowa.

For more facts Circle 554 on Reader Service Card



Glass-protected stacks...

Permaglas® smokestacks are glass-protected(inside and out)... are virtually impervious to condensate corrosion

* Accelerated life tests prove that *Permaglas* stacks last 3 to 5 times longer than plain steel stacks

* *Permaglas* stacks are easy to install—no special equipment needed

Write for the money-saving facts . . . get Bulletin SS-202

Through research . . . a better way

A.O.Smith
CORPORATION

PERMAGLAS SMOKESTACK SALES
PROCESS EQUIPMENT DIVISION
MILWAUKEE 1, WISCONSIN

A. O. Smith Corporation, Dept. F-79, Milwaukee 1, Wisconsin
Gentlemen: Please send me a copy of the Permaglas Smokestack Bulletin No. SS-202.

Name_____ Title_____
Firm_____
Address_____
City_____ Zone____ State_____

For more facts Circle 555 on Reader Service Card

CONTRACT MAINTENANCE

Begins on page 170

Can a company specify whatever detailed maintenance it wants, such as preventive maintenance?

Yes. A plant can lay down specifications for maintenance of any given equipment. The contractor will set up the procedures and controls, quote the cost in terms of per cent of current replacement value.

How close are your cost estimates?

Usually within 10%. Something is wrong if a contractor doesn't come within that limit consistently.

What plant men say:

- I'm from Missouri on this one.

Does your labor force punch in-out time clocks?

Mostly yes. The timekeeper reconciles over-all time with job times in calculating daily hours and in preparing the daily labor cost report.

How does a plant control in-and-out and in-plant movement of CM labor force? Do the men wear uniforms?

Our men wear badges. Uniforms are unnecessary.

How are materials and supplies controlled with CM?

We feel this is the client's function. If he buys, he controls prices. And since he must authorize all jobs, he controls usage. At Tidewater our company supplies storeroom clerks and material haulers. But the plant has its own material-control supervisor. We supply additional temporary buyers when needed.

Who decides types and level of materials and spare-parts inventory?

We submit recommendations to the plant maintenance manager. He decides. It's essential for the company to control its inventory. It's wrong to ask a contractor to make operating decisions, such as "Should we invest in this spare?"

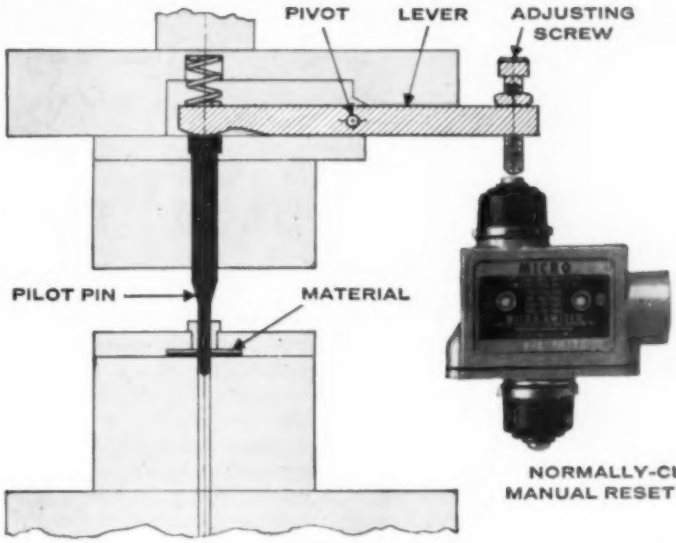
For facts about cost vs. payoff in CM—and more of this McCone interview—turn to page 190

MICRO SWITCH Precision Switches

You can make your plant equipment safer and more productive at small cost

Many plant uses for precision switches

TENSION CONTROLS
WEIGHT CHECKS
POSITION CONTROLS
CARRIAGE TRAVEL CONTROLS
COIL BUILDING CONTROLS
SAFETY DOOR INTERLOCKS
PUMP MOTOR CONTROLS
THICKNESS DETECTORS
SHEAR CONTROLS
COUNTING DEVICES
CONVEYOR STOPS
PRESSURE INDICATORS
FLOW INDICATORS
SAFETY CONTROLS
PAINT SPRAY CONTROLS
PROCESS CONTROLS
PACKAGING CONTROLS
MOTION CONTROLS
LEVEL CONTROLS
AND MANY OTHERS



NORMALLY-CLOSED MANUAL RESET SWITCH

For example: This switch detects misfeed of material in progressive die

This is but one of many low-cost ways to prevent damage to tools and dies with MICRO SWITCH precision switches. In this case the switch is interlocked electrically with the punch press clutch. It stops the press before a misfeed can cause injury to the die or damage to stock.

There are thousands of ways to make plant equipment more automatic, safer and more productive through the use of MICRO SWITCH precision switches. Their versatility, simple design, long-lived reliability, low initial cost and low maintenance costs add up to more profit when they are installed on existing machines.

Send for new data sheets on use of MICRO SWITCH precision switches for die protection. Stocks of switches are available at authorized distributors everywhere. Look under "Switches, Electric" in the Yellow Pages.

Some other die protection installations

MICRO SWITCH . . . FREEPORT, ILLINOIS
A division of Honeywell
In Canada: Honeywell Controls Limited, Toronto 17, Ontario

Honeywell
MICRO SWITCH Precision Switches

For more facts Circle 556 on Reader Service Card

Here's Part 2 (still starring Alan McCone) of FACTORY's all-you-need-to-know report on contract maintenance. His answers will help you in . . .

Weighing Payoff vs.

What are CM's principal advantages?

Force flexibility. With CM you can achieve absolute economy in manpower use, utilize qualified skills for only so long as you need them. For example, you don't use first-class or journeyman electricians to clean and replace lighting fixtures, as required by some plant labor agreements. Nor do you create make-work to keep men busy. If you don't need them, you let them go.

What plant men say:

- When all plant employees are not under the direct control of management, you lose flexibility by having to deal through a second party. You also may lose control over a group engaged in support of the manufacturing activity.
- Good management doesn't improperly utilize its labor skills.
- The rotation from plant to plant by floaters would cause confusion because of lack of uniformity of procedures, requirements, standards.

Can you cite other big advantages?

Many. A CM contract establishes a buyer-vendor relationship, which demands controls on cost and quality to a degree not usually found in "do-it-yourself" maintenance. It also permits concentration by higher management on production problems —quality, output, delivery.

What plant men say:

- The benefits of this buyer-vendor relationship are commendable. It gets to the heart of the problem: lack of proper recognition of the maintenance function. The development of good internal management will yield better results than CM.
- A "do-it-yourself" plant without buyer-vendor relationship needs a new maintenance manager and maybe a new general manager.
- Is a buyer-vendor relationship better than a management-labor relationship? I doubt it.

Often it's better to replace equipment than continue to maintain it. Are you interested in betterment of facilities? In the "do-it-yourself" set-up the supervisory and rank-and-file maintenance workers figure out shortcuts, kinks, better methods to handle or eliminate work. How do you feel about this?

A contractor must remain competent to survive. But remember, in all but a full-maintenance management type of contract the client is responsible for engineering and statistical analysis. Where Catalytic is responsible, its staff is alert to opportunities for betterment in design or procedures. In several cases we have cut pre-contract manpower needs substantially. In one case we showed a client how to avoid an investment of several hundred thousand dollars in maintenance facilities. Cross-fertilization is active in our own staff.

What plant men say:

- Cross-fertilization is not limited to consultants and contractors—there is fairly free interchange throughout industry.
- Good management of maintenance requires intimate knowledge of company operating programs, customer requirements, financial policy as regards capital investment in equipment, and many other sensitive areas of operation, which most companies feel should not be shared with other than their own supervisory personnel.

In a full-maintenance management contract isn't there danger that the CM management and supervisory staff will become somewhat permanent despite fluctuating workloads?

Nothing new about this problem. In slack times you try not to furlough key people. With a reasonable backlog of necessary work (but not urgent) you can retain the best foremen and mechanics. Conceivably a basic group could be employed continuously for years. But we have sometimes had to disband the entire workforce for short periods. In any event, we still are more flexible.

What CM Costs

What is the cost basis of a CM contract—cost plus, guaranteed maximum, fixed fee for overhead and profit, or a fixed price?

Cost of a full-maintenance management contract is usually based on the cost of all personnel on the job site—craftsmen, field staff, supervision, and engineers—plus a negotiated percentage for overhead and profit. This percentage varies depending on the volume of activity. Increments occur on a sliding scale. As the volume of work increases, the fee decreases. We don't like a fixed

Costs in Contract Maintenance

price—it's incompatible with a flexible workforce. And where the full content of a job isn't known until you open it up and get into it, a firm bid with a fixed labor quota may delay completion.

Aren't the hourly wage rates of contract labor in construction trades much higher than plant labor?

Yes. About 25% higher for most skills. But total comparable manhour costs of a contract can be less if you include all fringe benefits, plus the increases in the basic rate for the permanent maintenance force caused by the following items: idle time, make-work, more overtime, prolonged downtime on turnarounds and shutdowns (which decreases the on-stream efficiencies), lower worker productivity, and an increase in capital investments for restaurants, fancy change house, recreation facilities. Fringe benefits will run around 25% in most plants.

What plant men say:

• Comparisons in wage rate and fringe benefits must be studied for each case. Fringe benefits at 25% is a fair average figure. But the plant fringe normally includes items that are passed on to the client by the contractor—Social Security and other wage taxes, workmen's compensation and other insurance items, premium pay, and employee facilities. Some BT contracts are known to include vacation and pension pay over and above base rates.

• Our experience shows contractors' cost per BT man, based on same factors, is much higher than ours.

Why can't a plant force handle its maintenance cheaper, since it also has to pay a contractor for his overhead and profit?

I'm glad you asked this. You can't decide for or against CM strictly on a direct cost basis. Other factors such as peak workloads and quality of maintenance management are involved. So when you consider cost, look at over-all cost in labor relations, job quality, machine downtime, and so on. Often the dollar loss in output because of slow maintenance is many times the cost of a quick and thorough job. Here are other savings: Reduced investment in special tools rented short-term from the contractor and lower unemployment insurance costs against those of fluctuating manpower. To sum up, we think contract labor costs are lower than plant labor.

What plant men say:

• This is probably true for some cases, but untrue in many, perhaps most, cases.

• Plant overhead can be excessive, not necessarily in percentage but in unproductiveness. Good internal management precludes this.

• The absolute amount of supervision, planning, and other management effort required for optimum results is the same regardless of who does it. Under CM the contractor must make a profit, the contract must be supervised by the client, and a communication barrier must be hurdled in daily work execution. Assuming the same effectiveness under each system, CM has to result in a higher overhead cost.

What about the claim that a cost-plus contract lacks incentive for the contractor to keep costs down?

This criticism could apply only to full-maintenance management contracts. Even there, our administrative procedures provide for a daily cost-vs.-estimate check by client of every job—no matter how small.

What plant men say:

• Any good internal system should provide the same checks.

In time won't the BT unions get more fringe pay?

Possibly. But this isn't where CM's major benefits lie. It's just as likely that rises in plant fringe benefits will keep pace.

What plant men say:

• The client has no voice in the future negotiations between contractors and the building trades.

• Chances are BT union fringes will equalize with industry, thus raise CM cost.

Who pays insurance costs?

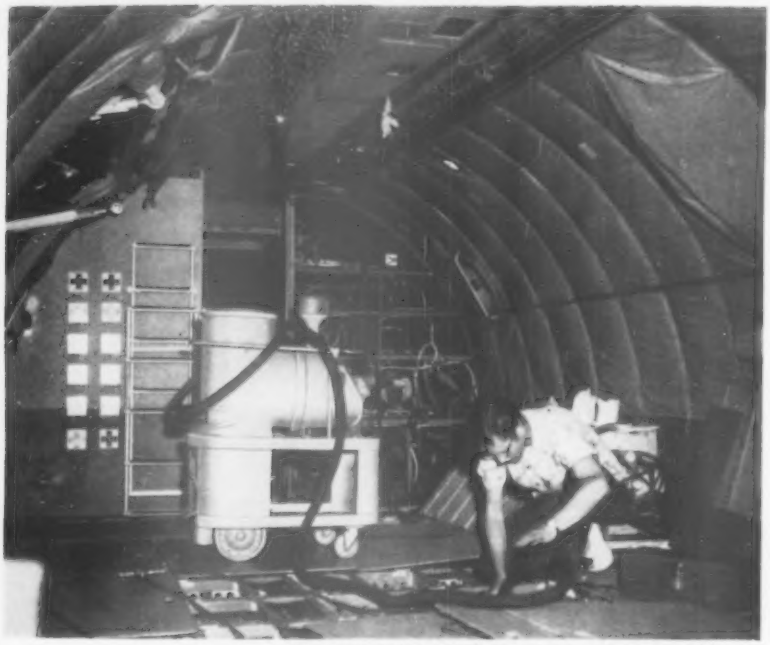
The contractor should give certificate evidence of all legally required coverage of workers—workmen's compensation, for example—also liability and property damage. The client pays for any contingent coverage he needs.

What plant men say:

• Of course these costs are passed on to the client in the fee.

Turn the page

Where dirt could mean disaster . . .



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CONTRACT MAINTENANCE

Begins on page 170

In the absence of competitive bids in a full-maintenance management contract, how does a plant know it's getting the best value?

Such a contract is not a blank check. For example, Catalytic does no major or non-recurring work without authorization based on a cost estimate. Thus there's always the competition of meeting a cost goal. If the estimates are reasonable and the goal is missed consistently, you'd better take a hard look at the organization or supervision. Maybe look for another contractor.

What plant men say:

• A good plant administrator can provide just as good cost control.

Does labor cost include travel time and expenses as is true with many service contracts?

No. In fact, Catalytic has negotiated other important concessions in wage practices in certain localities with the 14 international unions of the A.F.L. Building Trades Organizations. With these CM can be competitive. They include: (1) time-and-a-half for overtime, instead of double time; (2) provisions for working three shifts per day, seven days per week on a long-term basis, thus no premium pay for Saturdays and Sundays when a regular part of the shift schedule; (3) special favorable shift differentials; (4) use of mechanics of any craft for urgent work when the jurisdictional craft is not available. Basic wage rates were not broached because we knew CM could not attract qualified workers below going construction rates.

What plant men say:

• Where local unions have travel-time arrangements you'll pay them. As for waiver of jurisdiction, we've had to fight over this many times.

• Our Steelworker's AFL-CIO set-up has all these provisions.

What minimum facilities must a company provide CM personnel?

Adequate (but not plush) change-house and sanitary facilities, and a place to park. If the plant prefers, we can furnish them for an extra fee.

Turn the page

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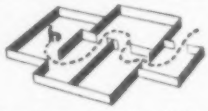
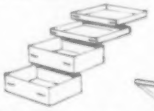
Up a stairway on a hurry-up job, nothing to it with the big, 10-inch diameter, semi-pneumatic balloon tires. Emergency repair work across the plant,  compact Tool Truck carries full tool selection to the job. Job in another building, the Tool Truck eases heavy loads over rough pavements or tracks. Drawers are held shut during travel by a padlocked bar.

The new *Snap-on* Tool Truck is invaluable wherever tools or parts transport is needed. Plenty of tool space with four husky drawers.  Upper panel section is partitioned for nuts, bolts, parts. Ample storage space throughout.

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Begins on page 170

Can You Rely on CM?

What does a plant do if its CM workers go on strike?

What does a plant do if its own people strike? With CM, at least there is a good chance of calling in another contractor. I know of one company that has a permanent supplemental-type agreement with three different contractors.

What plant men say:

- Has Mr. McCone ever attempted to get BT people to cross the picket line of a brother local? Just isn't done.
- You can't use other contractors in an "area" strike.
- I have seen many a construction project halted over craft jurisdictional disputes within the AFL building trades unions. They take a stronger stance on craft jurisdictions than do plant maintenance unions.

Have any CM workers ever become unavailable in a dispute over wages, working conditions, or jurisdiction?

In over five years we have never had an entire work stoppage. Members of one craft have stopped over local contract negotiations but were sent back to work within a few hours by the international offices.

What plant men say:

- Take it from Old Man Experience: Any picket line means no crossing by a union man. What happens if local disagrees with international?
- Doesn't instability of employment work both ways? I can see a maintenance manager waking up some morning to find a good portion of his contract labor force has left to work on a large construction project offering lucrative overtime pay.

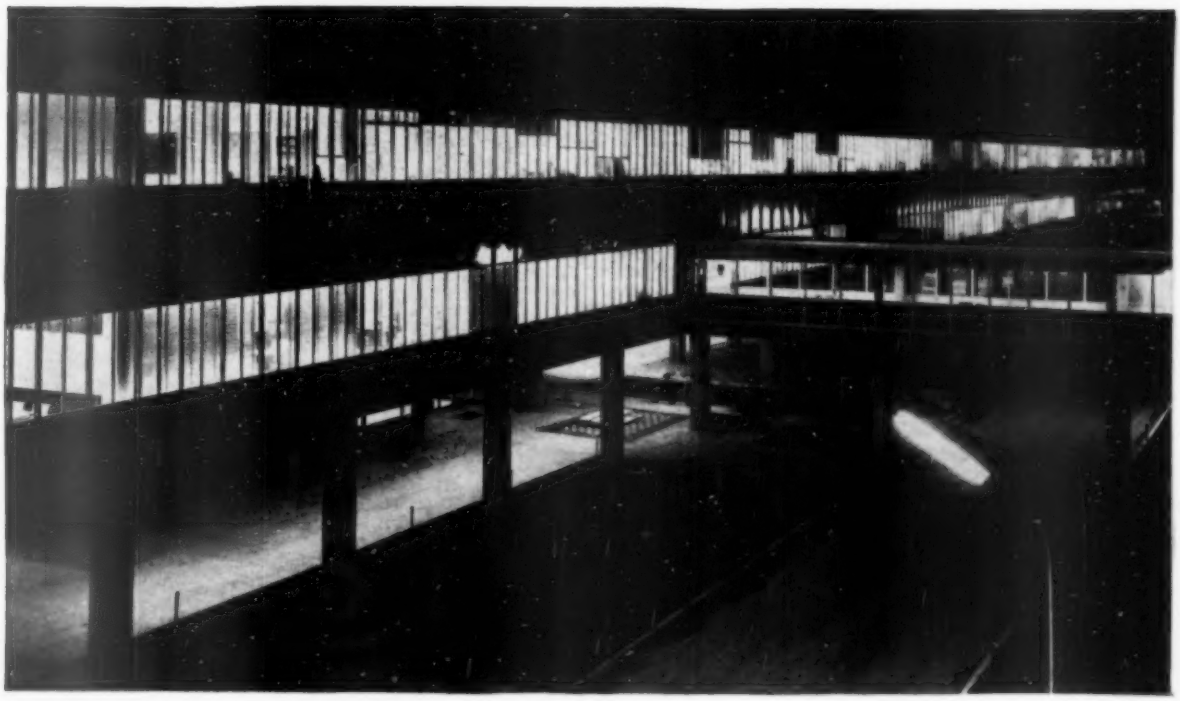
Will CM labor abide by plant rules?

Yes. Any uncooperative person can be dropped at will.

How does a plant shop around for CM? On a price basis?

That's far from the right way to approach it. Most important is to get

hundreds of windows, airtight and water-proof!



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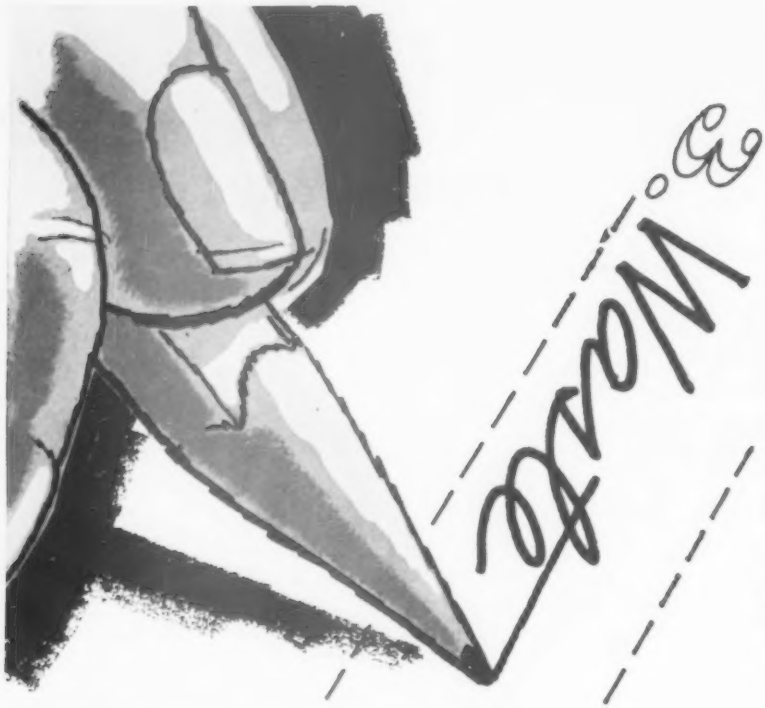

SURVEY DISCLOSES INDUSTRY'S NO. 3 SKIN HYGIENE PROBLEM: WASTE SOAP

Here's The Answer To It From SBS

The most difficult three industrial skin hygiene problems, as rated by 2,177 major plants recently surveyed, are:

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3. *WASTE OF SOAPS*

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a professional in maintenance, one who knows the difference between plant operations and construction. Second, get a contractor who can provide proper skills on short notice. In one case a plant trying to keep its own organization thin had trouble because the contractor couldn't fill the demand for proper skills. Don't ask for performance guarantees. They are usually worthless because a poor or late repair can't ever catch up to a good one.

A plant relying on CM may curtail or eliminate its maintenance training programs. What happens in a tight labor market? Does it suffer a skills shortage?

This is less likely to happen when you're dealing with the national BT organizations. A big company recently built a plant in an isolated region in South Carolina. It drew in the thousands of construction people from other areas. In one emergency case we had to provide about 100 welders and boilermakers. It took us a week to do it, but what would the company have done on its own? Kept a "fire-house" crew standing around? That's a pretty expensive hedge, isn't it?

What plant men say:

• Certain types of plants will have to rely on a contractor during start-up for skilled labor. But the sooner such a plant swings into a training program and provides some incentive for job security, the more efficient and better workplace it will become. Management must provide adequate and forceful controls, however, and not let a union wear down its rights and prerogatives by yielding to unreasonable demands or psychological pressures.

How CM Is Organized

What happens to the maintenance-management function during contract maintenance? Doesn't the client lose his close touch?

A company does not surrender any more control than it wants to. It usually still has a maintenance man-

Turn to page 200

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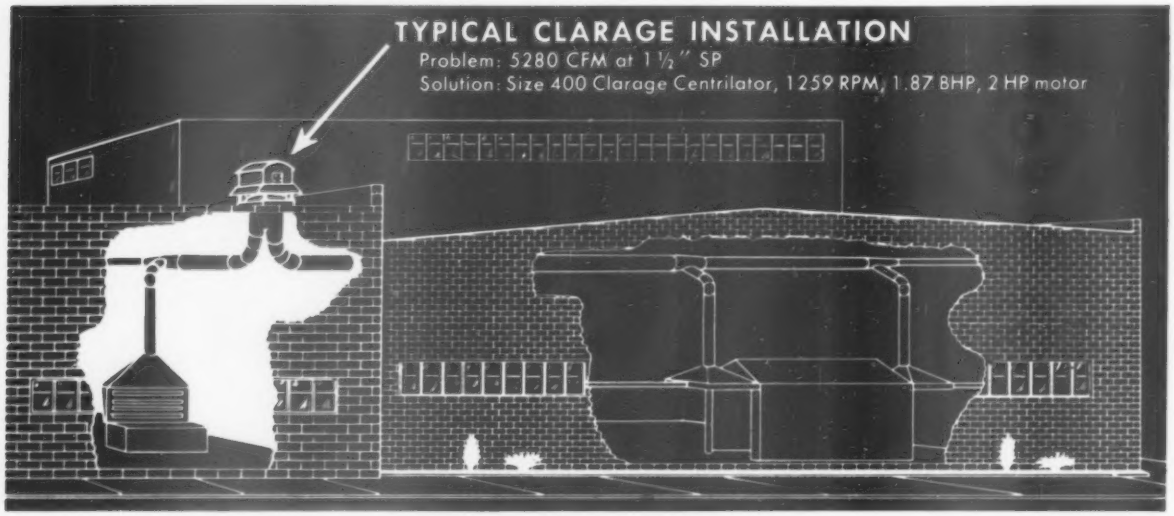
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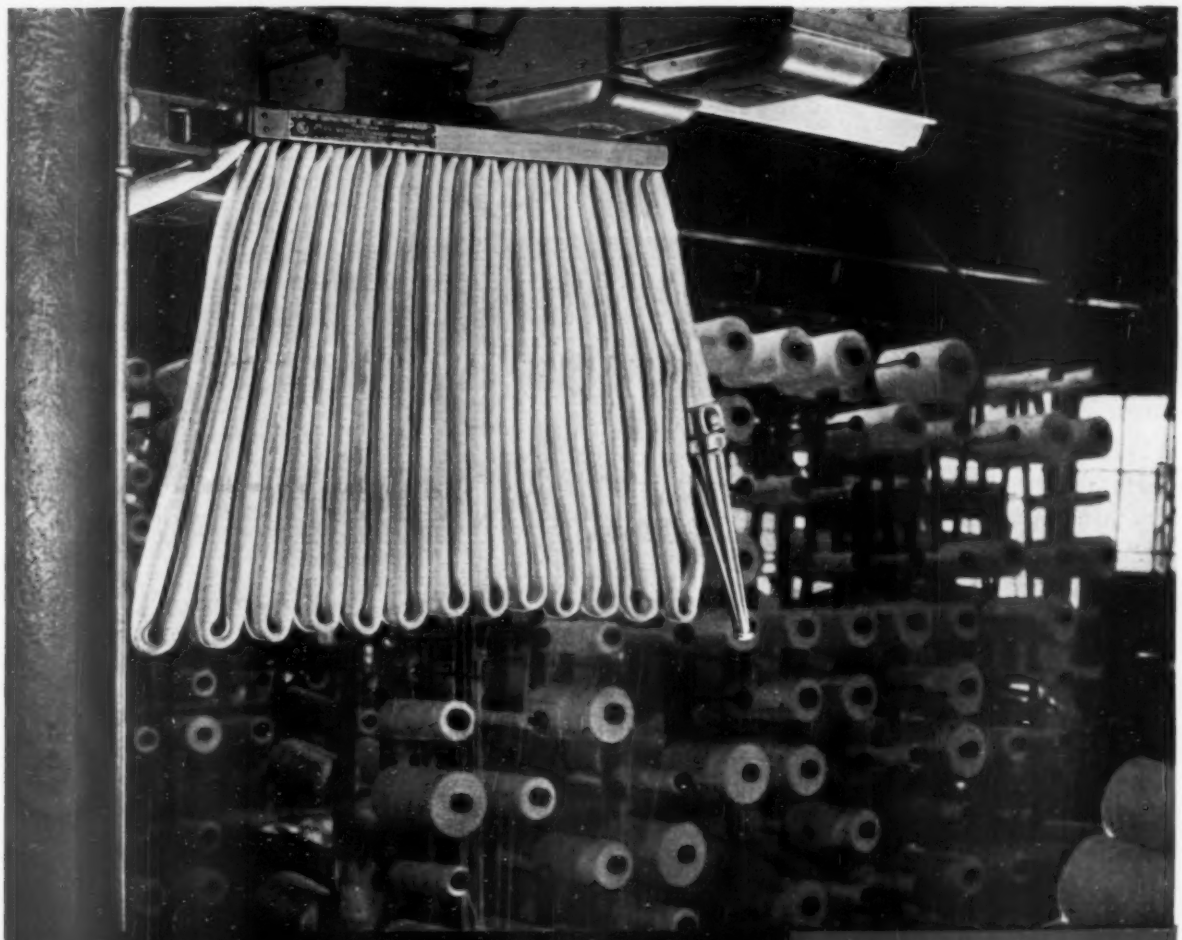

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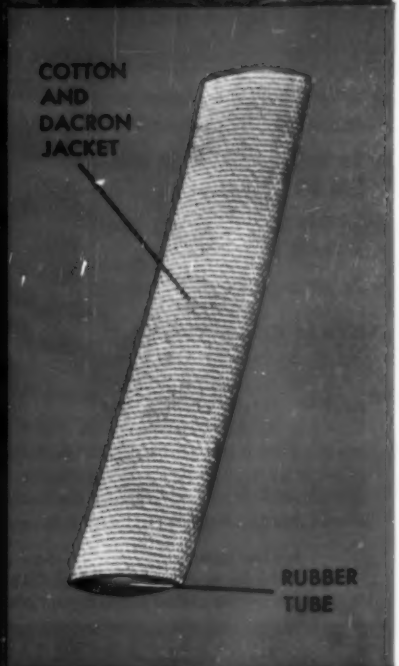

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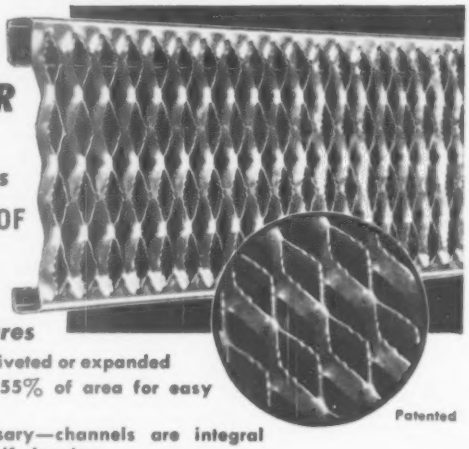

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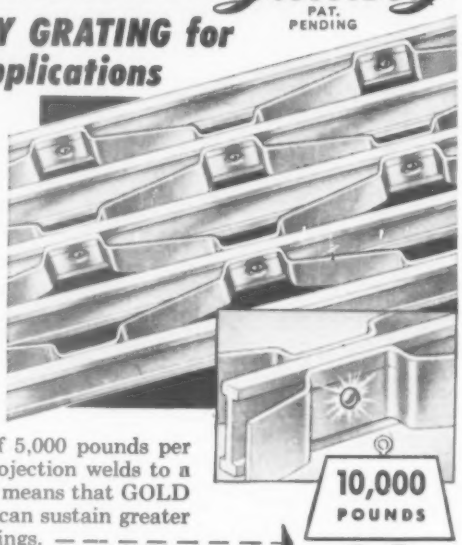

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Begins on page 170

ager who gets activity and control reports. The contractor can furnish a project engineer who can make recommendations, plus whatever management organization you ask for. In the Tidewater set-up, for example, the plant's maintenance management group operates somewhat like a procurement organization. Work requests originate at the operating level and are processed by the Tidewater staff to determine whether the work is necessary for efficient operation. Major work requests require an over-all cost estimate and tentative schedule. Once the order is issued, the contractor is responsible for completing the job.

What is the usual ratio between number of field workers and CM administrative staff?

Roughly, one staff man to 17 field men, including craft supervisor. In certain contracts Catalytic has furnished field supervision as a percentage of labor. This has run just under 6%. We also have agreed to furnish field office expenses as a percentage of labor—about 4%.

What plant men say:

• While a contractor may handle a job with a small permanent staff, the general foremen (who are union members) tend to overman their jobs. If plant planners and schedulers try to correct this they often run into jurisdictional problems.

• This staff ratio is too high—ours runs 1 to 36 for field men.

Do the BT men permit direct supervision by plant men?

Once the men understand the relationship between client's and contractor's personnel, we have found no trouble with arbitrary regulations over the two groups working together. Both must keep in mind a basic principle: A man cannot have two bosses at the same level.

What plant men say:

• Can be done, but with difficulty, at least at beginning.

For facts about labor problems in CM—and more of this interview—turn to page 202

For more facts Circle 565 on Reader Service Card

For more facts Circle 566 on Reader Service Card ▶

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And now, Part 3 of FACTORY's question-and-answer report on contract maintenance, again featuring Alan McCone. It will give you help in . . .

Meeting the Labor

Doesn't the big difference between construction and plant wage rates create friction?

Not if you're careful to point out to the plant worker the relative continuity of his employment, and his fringe benefits. In most cases he'll realize he's well off.

What plant men say:

• But what if CM involves layoff of dues-paying union members who are in the maintenance department?

• Not so—our own CIO men are always complaining about contractors' AFL wage rates.

Doesn't CM create traditional frictions between production and maintenance forces because they are working for different bosses?

This hasn't been our experience. On the contrary, we create a competitive spirit plantwide. But if there is a troublemaker, the plant can ask for his immediate removal. The contractor doesn't need to transfer him —he can terminate him.

What plant men say:

• Judging from experience on past construction jobs, such friction can be rough, and not so easily solved.

• Seems to me jurisdictional problems arise more often among BT groups than within an in-plant group.

How can a plant with maintenance labor agreements adopt CM?

It's easier to start CM in a new plant. A switch to CM in an existing plant is difficult. Usually it cannot be done in one move, takes a long time. Much depends on the atmosphere in the plant—whether it's hostile or willing to face economic facts. You just can't arbitrarily displace an organization. There may be legal as well as employee relations problems to solve. But it has been done.

Severe economic readjustments required one plant to trim its maintenance force from 700 to 175 people. Now in the upswing, it is using supplementary CM labor to handle its capitalized jobs—and doing them more efficiently. Another company with a plantwide industrial union decided to expand its operations and use CM workers. Despite heavy union protests, it asserted its rights. It now has 35 to 40 CM men of various crafts working under the same control as the regular crews. So in plants other than brand new ones, your only reasonable approach is by normal attrition of plant crew or growth of maintenance demands.

What plant men say:

• The company got by in expansion because no one's job was in jeopardy. What happens if there's a force reduction?

• Under our present union contract we couldn't possibly use CM for work our present ten crafts handle.

• In starting a new plant we promote and upgrade certain workers transferred from existing plants. CM wouldn't permit this.

With CM, how does a plant coordinate production and maintenance?

No problem. Client maintains control to whatever degree he prefers.

What plant men say:

• Our industry calls for close cooperation between maintenance and production. It requires a thorough understanding of production problems and processes. In engineering new processes we constantly keep future maintenance and repairs in mind. We can't contract maintenance any more than design.

Do the contractor's forces ever lay exclusive claim to a certain type of maintenance work?

In our concept no work belongs to the contractor's force. It all belongs to the plant, for assignment at will as economics dictate. As a principle, no lines of jurisdiction can be made inflexible between the two forces, or within the contractor's force. A pipefitter will share his work with a millwright or boilermaker if he knows it is one of the rules of the game and that he may later share in another's work. We've had many cases where work started by one group was finished by another. Understanding of the ground rules is the key to this harmony.

What plant men say:

• Sounds nice, but we had a strike on this very point, with contractor's men and plant men mixed.

• Jurisdictional disputes may flare up where the contractor's union differs from the basic plant union.

• Despite agreement on ground rules, anybody who has had experience with AFL crafts knows they won't yield on this except in dire emergencies. The plant still has to adhere to regular craft channels.

Problems in Contract Maintenance

Measuring Workers

There are two main values in evaluating a maintenance worker—productivity and quality of work. Let's explore productivity first. Have you facts to show how a BT craftsman compares with a good plant man who knows every inch of the plant?

This question deserves a thorough answer. So please hear me out. There's no universal standard for measurement of performance of either group. But where comparisons are possible, we find BT men exceed man-hour performances set by plant forces. In certain repetitive jobs where accurate cost records were available, such as standard pipe welding, BT craftsmen performed these functions in 8% less time.

Naturally a maintenance manager hates to admit that CM men generally are better. But neither will some admit to a top effectiveness of 35 to 45% of their own men. Planning, scheduling, and supervision are important elements in this score. Let me quote from Norton M. Brown, plant engineer, Pennsalt Chemicals Company (Wyandotte, Mich.), who discussed this very question as a panel member at the Tenth Annual Maintenance Conference. He said: "Other things being equal I would say that productivity per man is likely to be a little bit better with contractors."

Our basic point here is that a BT worker's tenure in his job depends solely on his performance. He can't afford to let down or coast on past performance. If he wants to be retained when the peaks are passed he knows he will be judged on his record. And he knows that every job has a cost goal that shows up poor performance. This should answer the question as to why a contractor can expect his "as needed" men to push steadily on the job.

What plant men say:

- The fault of low utilization of the worker lies primarily with plant management. It results from inadequate planning and scheduling, uncontrolled emergencies, being overmanned, and so on. With improved management CM can't demonstrate any inherent advantages.
- The maintenance employee working for a contractor will not have the same feeling of responsibility and participation as the direct plant employee who is accumulating seniority and job security.
- With CM you have to depend on a contractor's appraisal of a worker's skill. With your own force and a good training program for upgrading skills you know what your men can do.
- A work sampling study tells us the CM worker is not nearly as good as our own trained, skilled worker.

Suppose a CM worker isn't productive. What then?

Simple. You check him off, get another. No man is married to the payroll. If you want to carry this question further, how about the physically incapable plant worker, or the older worker who won't improve because he's protected by seniority? Ask any maintenance manager and he'll admit there's little immediate action possible in these cases. What such a craftsman needs is competition—and a CM worker always has it.

What plant men say:

- Most plants can discharge with cause. Many may do a poor job in this respect. Good internal management can reduce this problem to an insignificant minimum. Nevertheless CM has a slight advantage here.
- The older worker problem can be cured, as we have done it, through a training program, a performance appraisal program, and a refusal to "make" jobs for light-duty cases.
- A good maintenance superintendent plus a good industrial relations man could clean up the older or decrepit worker problem.
- That the BT unions (AFL) are adamant in their opposition to any form of labor standards is common knowledge—they object to anything that will raise worker productivity.

In force flexibility, which you repeatedly emphasize, isn't there a loss in productivity by the frequent turnover of manpower?

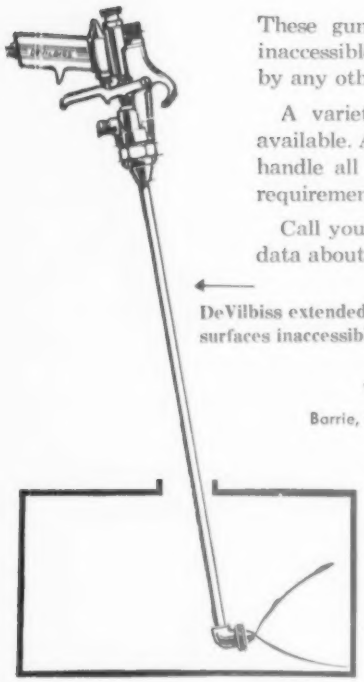
In that part of the force subject to heavy turnover, productivity does suffer. But measure this against a 100% loss if the fixed plant force is idle or gets forced into made work. What's even worse about made work is that it often consumes materials on unnecessary projects.

What plant men say:

- Proper backlog control eliminates make-work practices.

Turn the page

SOLUTION: Use a DeVilbiss extended-nozzle spray gun



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CONTRACT MAINTENANCE

Begins on page 170

• Our own maintenance personnel is familiar with locations of all control valves, pipelines, functions, and requirements of the different services. Whenever we've had outside contractors on major jobs, we've had to assign our own men to show them the way, and give explanations.

Now let's look at the quality of performance. Can't a dyed-in-the-wool plant man do a better job than a CM worker because of his familiarity with plant needs?

Familiarity isn't the main requirement for quality—it's skill. Proper job instructions can overcome most lack of knowledge in operating problems. True, on certain pieces of special equipment an area specialist is able to diagnose and repair trouble more quickly. But in most plants this constitutes only a small part of the workload.

The big question is whether you have the right and best skills on each job. Many plants fill vacancies in the maintenance department by posting the job and selecting men from production or other ranks. Often, the upgrading procedure is swayed by seniority rather than best skill. A CM worker of journeyman caliber can usually outperform these types of locally trained men.

What plant men say:

• This is the one most important, favorable point to be said for CM.

• A good plant training program and strict qualifications tests insure a good supply of necessary skills.

• Our maintenance superintendent does not have to accept any unsuitable applicant any time.

• Since familiarity with plant layout and equipment is so important to attain low cost and high productivity, the plant man has the edge. Would a refinery BT man feel at home in a foundry, or *vice versa*? What about the complex machinery in today's plant? Where would a BT worker pick up the required general and diagnostic experience about such things as x-ray, spectrometry, and a hundred other specialties. Our electricians have this knowledge, but it wasn't picked up overnight.

• The BTU men are trained in one craft only. Maintenance men are

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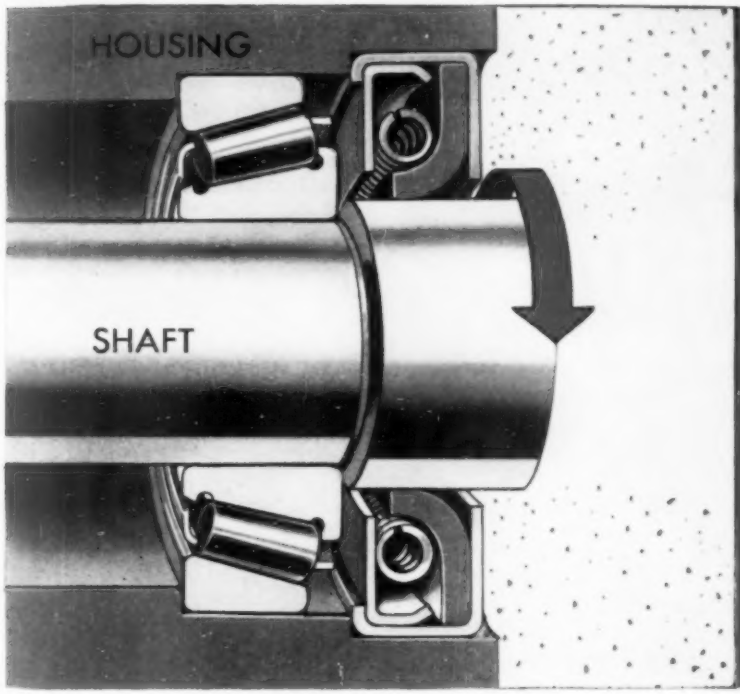

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often called upon to perform tasks other than their specialized trade.
• It takes years of training to properly operate and maintain our complex service systems, apparatus, and equipment. We did not develop competent troubleshooters overnight.

Are you saying that given proper instructions a BT construction man can be superior to a plant man?

Yes, if a special skill is needed. Too many plant men are of the versatile handyman type—the jack-of-all trades and master of none. Anyhow, in our experience, skills are secondary to proper supervision, and top skills are often not needed.

Take a job such as a process unit overhaul. About 75% of it could be called bull-work—unbolting and disassembling heavy parts. Some 25% involves real craft skills—pipefitting, welding, rolling tubes, wiring circuits, and so on. So even run-of-the-mill BT mechanics are good enough for much of this maintenance work, if supervision is competent. Another important factor is that in the planning stage jobs are analyzed and broken down. The planning is performed for the craftsman.

What plant men say:
• Our reliable records dispute Mr. McCone's contentions—individual worker productivity of contractor's labor averages 20% less.
• We need both specialists and handymen. The AFL with its strict craft lines is not going to help here. And it won't let skilled workers cross craft lines for the bull-work.
• Proper supervision—not CM—is the key to good, low-cost maintenance in every plant.

When your labor sources are not able to replace incompetent BT men, don't your high claims for work standards go to pieces?

Our business is to find the best man for the job at the going price. If the level of competence in an area is low, we can only get the best possible. We can't get superior industrial electricians where only housing wiremen are available, but we can go out of the area to get them. Our

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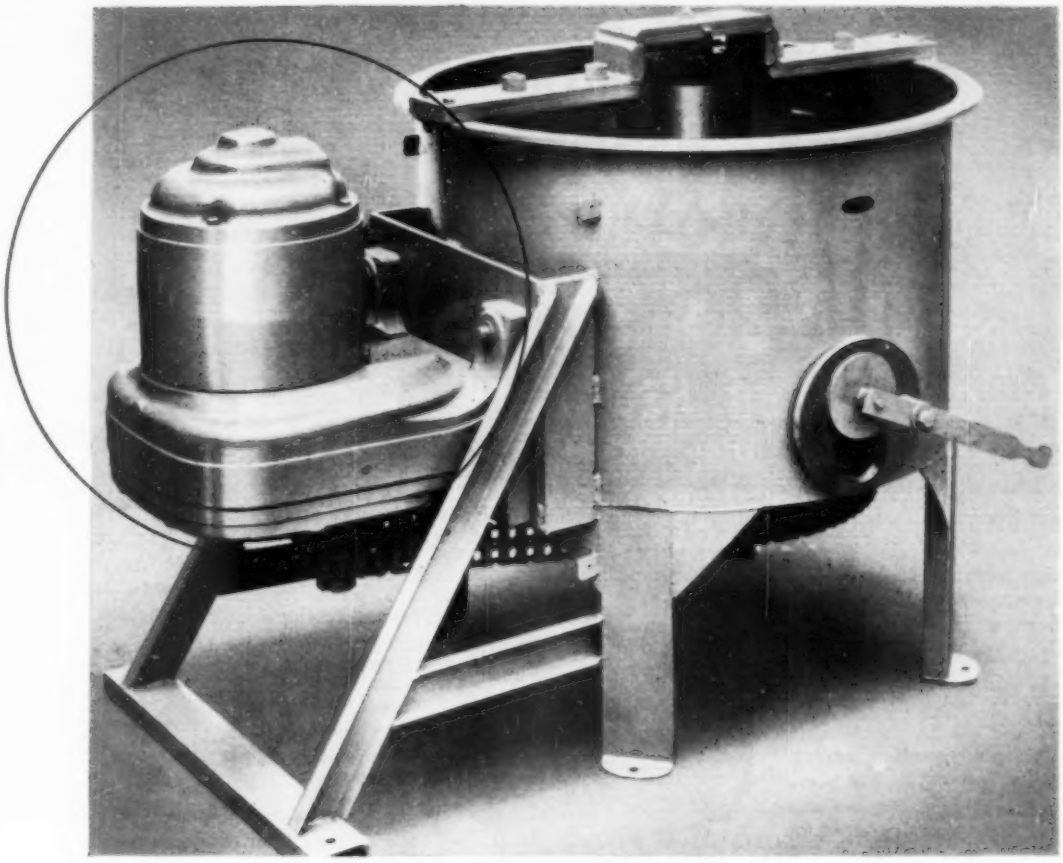

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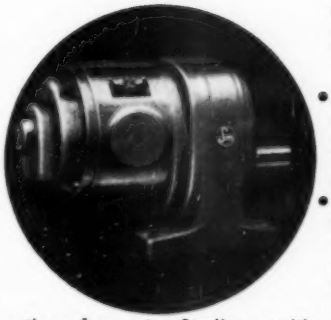

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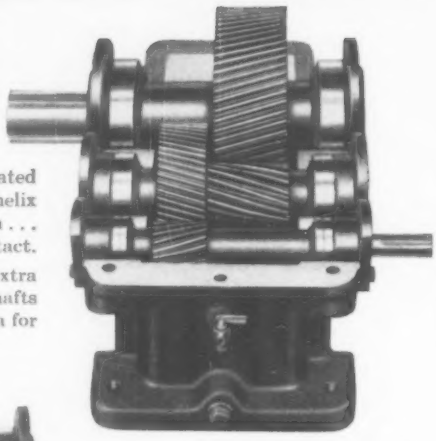

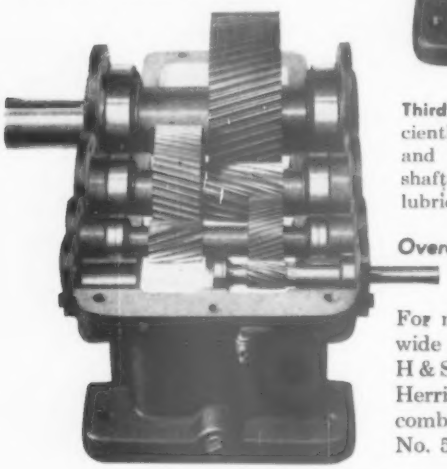

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problem is no worse than that of the plant looking for qualified workers. But at least we don't have to keep our workers if they don't look promising.

What plant men say:

- I'll bank any day on getting better men by training our own.
- We don't have to keep unqualified workers either.

Isn't it true that to hold good BT men you must provide reasonably steady employment? How do you reconcile this with the major CM advantage of force flexibility?

Most of our contracts involve a basic force. No individual has the assurance he will always be a part of it. On the other hand, because this force is the pick of the crop, it is attractive to highly qualified BT men. But when performance becomes unsatisfactory we can terminate regardless of length of employment.

What plant men say:

- This is no different from what a well-run plant force has to do.

Most maintenance managers contend their own gang performs better in emergencies. Would you agree?

Local plant men might have some edge in attitudes that generate sacrifices and loyalties. But how about the time between such emergencies? Few plants can afford a standby crew sitting on its hands waiting for trouble. This "own gang" concept can be mighty expensive.

What plant men say:

- All our work must be authorized, or we reduce the force. Between peaks such authorized work may be deferred maintenance, alterations, new construction, or pre-fabs.
- Good maintenance mechanics seldom hesitate to cross craft lines when emergencies arise.
- I doubt the BT worker has the same pride and loyalty as a plant man. This shows up particularly in emergencies.

For facts about your union contract and CM—with tips on some of the pitfalls involved—turn to page 210.

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Finally, here's Part 4 of FACTORY's wrap-up report on contract maintenance. Paul King (photo), ranking expert on interpreting union contracts, tells you about the legal pitfalls and offers help in . . .

Handling Labor Relations

DOES CM (contract maintenance) appeal to you? Does it offer worthwhile savings? Will it solve tough maintenance problems? If so, maybe you think you'll try it out.

But hold on. You're not yet through weighing the pros and cons. For CM usually raises industrial relations problems you've got to anticipate before you dive into a CM contract.

There are times and conditions when CM is feasible—and when it's not. Nobody can give you a straight "you're-in-the-clear" directive. You must analyze your own situation and decide on its merits. You may even have to feel your way. To help you appraise the possibilities of CM, FACTORY has asked its "Labor Relations News" columnist, Paul A. King (Attorney, Bigelow-Sanford Carpet Company), to point out the main pitfalls and tell you how to evaluate them. His comments can help you check your chances of successfully adopting a minor or major CM program.

Now listen as Paul King turns his experience to the labor-relations problems of CM. Here he is:

DOES CM SPELL TROUBLE?

This question is bound to come up whenever a plant sees dollar advantages in CM. What are management's rights? And what are the chances it will be supported if a labor hassle occurs? Of course, you don't want to adopt CM if you can't make it stick. Or it may not be good for you if you can make it stick only at the high cost of labor unrest.

The idea of contracting work out isn't new. More companies than not do this in subcontracting for production parts and subassemblies. They do it for maintenance services —janitorial work, plant guards, cafeteria catering, electrical work, to mention a few. CM, as FACTORY has defined it, is nothing more than an extension of the practice of handing out plant functions to independent contractors. And when you begin to hand out plant functions you run the risk of trouble with your union (if you have one), your nonunion employees, and the community where the plant is.

What are the practical or legal limits to this practice? That's the big question when considering CM. There's only one answer: "It all depends on individual circumstances." An extreme case of subcontracting exists in the needle and dress trades, where you run a sales office—perhaps purchase the raw materials—but get others to make the finished product. Don't expect this precedent to carry over into your industry or the maintenance function in particular. Best gage of whether your plant can adopt CM is the experience of industry to date with other less drastic and more conventional forms of contracting out work.

Scanning the obstacles—Let's take a look at the chief roadblocks to a CM program:

1. Your plant union contract. It may say a flat "No." Or if it says nothing so direct and clear, it may contain other clauses that clearly or by inference prohibit contracting of maintenance work.

2. Arbitration awards. There may be many on record that negatively interpret your contract against CM. How other arbitrators have handled a particular situation can affect your case.

3. Past plant practices. Some precedents might work against CM. Some, of course, could help.

Weighing the questions—Assuming the answers on the counts above are favorable, you're still far from being in the clear. Because other conditions can arouse worker distaste for CM. Any one answer or combination of unpalatable answers to the following questions can arouse antagonism and kill your chances of a successful CM set-up.

1. Is there full employment in your plant, or is there a large layoff list of workers?

2. Is the CM contract limited to peak-load work or does it include year-around maintenance?

3. Do you have a militant, aggressive local union in your plant? Or if you have a sympathetic local, is it affiliated with an aggressive international?

4. Does CM work require skilled or unskilled labor? (If the latter, you have a better chance.)

5. Does the CM work displace a large or a small group of workers? Can you provide work elsewhere in the plant for such workers at approximately the same pay?

The impact of all these influences depends much on whether your plant is union or non-union, and whether you are introducing CM into a new plant or existing one. Let's take a closer look.

When You Use Contract Maintenance

CM WITHOUT A UNION

Say you're setting up a new plant. There's no union now in sight—in your present set-up or in the new operation. This is one of the easier situations to cope with, yet not without hazards.

If the CM force is going to enjoy higher take-home pay, you may have trouble convincing your "chronic griper" of his compensating advantages in fringe benefits. He'll be a troublemaker—ripe for plucking by the first union coming down the pike to capitalize on the discrepancies in wage payments.

If the CM force is unionized, the problem is apt to be even more acute. The danger of contaminating a non-union operation through close contact with a unionized force can't be overlooked. It makes for a nervous management.

Let's look at a slightly tougher situation. Assume that you're unionized in your present plants, but not in the plant you are about to set up. Besides the above problems you've added these: If the new plant needs the same crafts, your union may try to organize the new shop. But you've armed it with more organizing arguments—namely, that the company would not dare to contract out work if the shop were unionized. Without a union, it will effectively say that workers can be ousted from their jobs by CM men.

But say you're already in an established plant. It's rougher. You may have to lay off, fire, or transfer employees. Depending upon who and how many, this can kill morale and open the door to employee unrest. And consider the effect of CM on personnel and community relations. Although this can be a factor in the new operation, too, it's a more potent force when you have been established in a community for a while. In the trend of plants now locating in the countryside, how will communities—especially small ones—take to bringing in outside labor? Especially if there is unemployment in that town. Suppose you have to lay off men to bring in CM workers. What if such men are old-timers with long service? These possibilities lend support to the argument that CM is best accomplished when going fresh into a new plant.

CM WITH A UNION

Here you face a complex problem. Let's assume that you have a union covering all jobs in the plant, including the functions to be contracted out. Your union contract, your union's attitude, the way an arbitrator is likely to react to your situation, your past practices—all these will determine what you can or can't do.

Analyzing your contract position—First step in checking the feasibility of CM is to see if there is any language in the union contract that expressly denies you the right to contract out work or gives you unlimited rights in this area. Odds are you draw a blank here.

With the prospect that you'll ultimately have to "sell" the union on your right to install CM, take a look at your management rights clause. In essence, this gives you the right to manage the workforce and determine how the work is to be performed. If your clause is typical you're still not home-free.

Now search for any side agreements on the subject that forbid the practice. Have there been any situations where you tried to contract out work, and the union kicked and you gave up the idea? On the other hand, do you have precedents of work contracted out? If so, your management prerogatives clause is strengthened. Unless, of course, the union can show that the earlier case was confined to an emergency situation or to a special situation—such as a casual rigging job.

If there's to be a showdown with the union, you'll probably end up in arbitration. So it's a good idea to know how you're likely to make out. In the conventional area of contracting work out, arbitrators have ruled on both sides of the fence.

WHERE UNIONS STAND

With more drastic CM, you can expect arbitrators to look harder at the contract—listen more closely to the union. And here's what the union will argue:

- **Discharge clause.** The union argues that this clause means you can discharge for cause only. It may claim that displacement by a CM worker is not discharge for cause.
- **Lockout clause.** The union argument is that the employees are locked out by the new workers.

Turn the page

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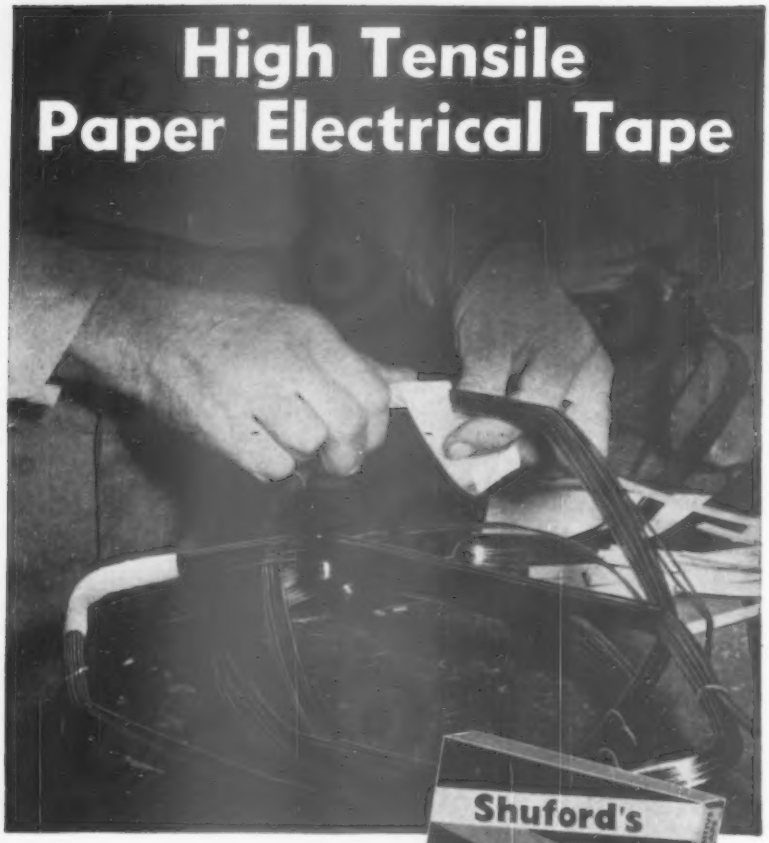

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Begins on page 170

• **Hours-of-work clause.** The union likes to argue that this clause is a guarantee of work for the hours set forth if work is available. And work in the CM category, it adds, is available.

• **Representation clause.** This certifies the union as bargaining agent for the crafts enumerated—no doubt maintenance men are listed there. Management has argued—successfully—that the purpose of the clause is for the company to recognize the union as bargaining agent, but in itself the clause doesn't create an obligation to retain them on the payroll. (Remember, you as an employer can argue that nothing in the contract requires you to stay in business or keep certain types of workers on the payroll.)

But the union has also successfully argued that if management followed this course to its logical conclusion, it could virtually destroy the union by removing all crafts from the plant, thus making the representation clause a hollow shell. This never was the intent, it argues.

• **Seniority rights clause.** Of what value are seniority rights, the union will argue, if an employee can be discharged at the mere fancy of the employer?

• **Layoff clause.** This may give you the right to lay off employees when there is no work. But, the union may contend, there is work.

The lesson here is to examine these clauses carefully. Also examine all arbitration cases on contracting out the traditional guard work, janitorial services, etc. There have been awards where the facts were substantially the same in two cases, with contract clauses also similar. Yet the arbitrators ruled opposite ways. Reason: One case has a lot of personality. That is, the arbitrator is more impressed by the people before him than by the words of the labor contract.

Unemployment in the plant, tradition, financial hardship of the employer—all count with the arbitrator. If the employer can truly demonstrate that CM is needed to make the plant profitable and save other jobs in the plant, your chances of success with both union and arbitrator are improved. On the other

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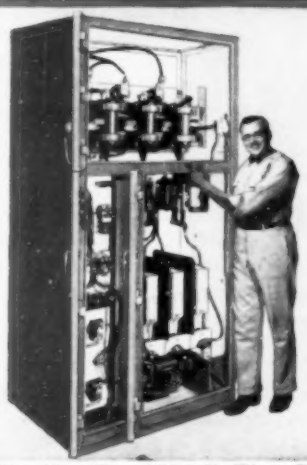
Only One Moving Part
Simple solenoid design eliminates trouble-causing pins, pivots, and flexible jumpers.



A-B High Voltage Starter with Air Break Contactor

Bulletin 1159 high voltage air break, across-the-line induction motor starter in NEMA Type 1 enclosure. All Allen-Bradley high voltage starters are equipped with current limiting fuses with interrupting capacities of 150,000 kva at 2300 v; 250,000 kva at 4600 v.

ALLEN-BRADLEY

Member of NEMA

Quality Motor Control

Allen-Bradley Co., 1321 S. First St., Milwaukee 4, Wis. In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

What BRONCO PATENTED* branding means to you!

You know your electrical cords and cables are the toughest you can get when you find this name molded* indelibly into the outer 67.32% Neoprene jacket.

YOU KNOW
YOU ARE
GETTING WHAT
YOU ORDERED

67.32% NEOPRENE TYPE W 3 COND #8

HIGHEST NEOPRENE CONTENT IN THE INDUSTRY to give your cable maximum protection from oil, heat, acid, abrasion, etc.

TYPE AND SIZE are molded* into the jacket as well as rated voltage & "P116BM," Bureaus of Mines official approval number.

SELF-MEASURING – Branding* is repeated every two feet exactly. Want 20 feet? Count 10 Broncos and cut.

*U.S. PATENT #2867001

Write for free sample!

WESTERN INSULATED WIRE CO., LOS ANGELES 58, CALIF.

For more facts Circle 575 on Reader Service Card

ACME VISIBLE

VISUAL CONTROL PANELS

Chart Action, Indicate Trends, Permit Comparison, Organize Facts

Complete flexibility with limitless signalling and charting possibilities . . . Easily adapted to your individual record requirements.

Lightweight panels contain clear plastic tubes which are individually removable and may be shifted from one position to another . . . Clarity of tube provides full legibility of contents.

ACME VISIBLE RECORDS, INC., Crozet, Virginia
☐ Send us more information on Visual Control Panels.
☐ We are interested in Acme Visible equipment for _____ records.
Kind of record
FM-759
Company _____
Attention _____
Address _____
City _____ Zone ____ State ____

hand, one arbitrator ruled on a case of contracting out this way:

"A company can always try to hire new employees at lower rates than old workers, thus save money. It is precisely to prevent this type of false economy . . . that union contracts are signed. If the company can subcontract its maintenance work on its own terms and fire employees with years of seniority by so doing, there is nothing to prevent it from bringing in a bookkeeping company to subcontract its office department's operations or a packaging company to subcontract part of its warehouse operations."

If your contract and arbitration awards fully support your case for CM, don't overlook the illegal but still crippling wildcat strike and slowdown. The intentional inefficiency of in-plant workers may more than offset the gains from CM.

HOW TO INTRODUCE CM

Much of the receptiveness to CM depends on the climate of the plant. Many employers have been able to contract out work despite adverse clauses because the climate was right. The following conditions are typical of good climate:

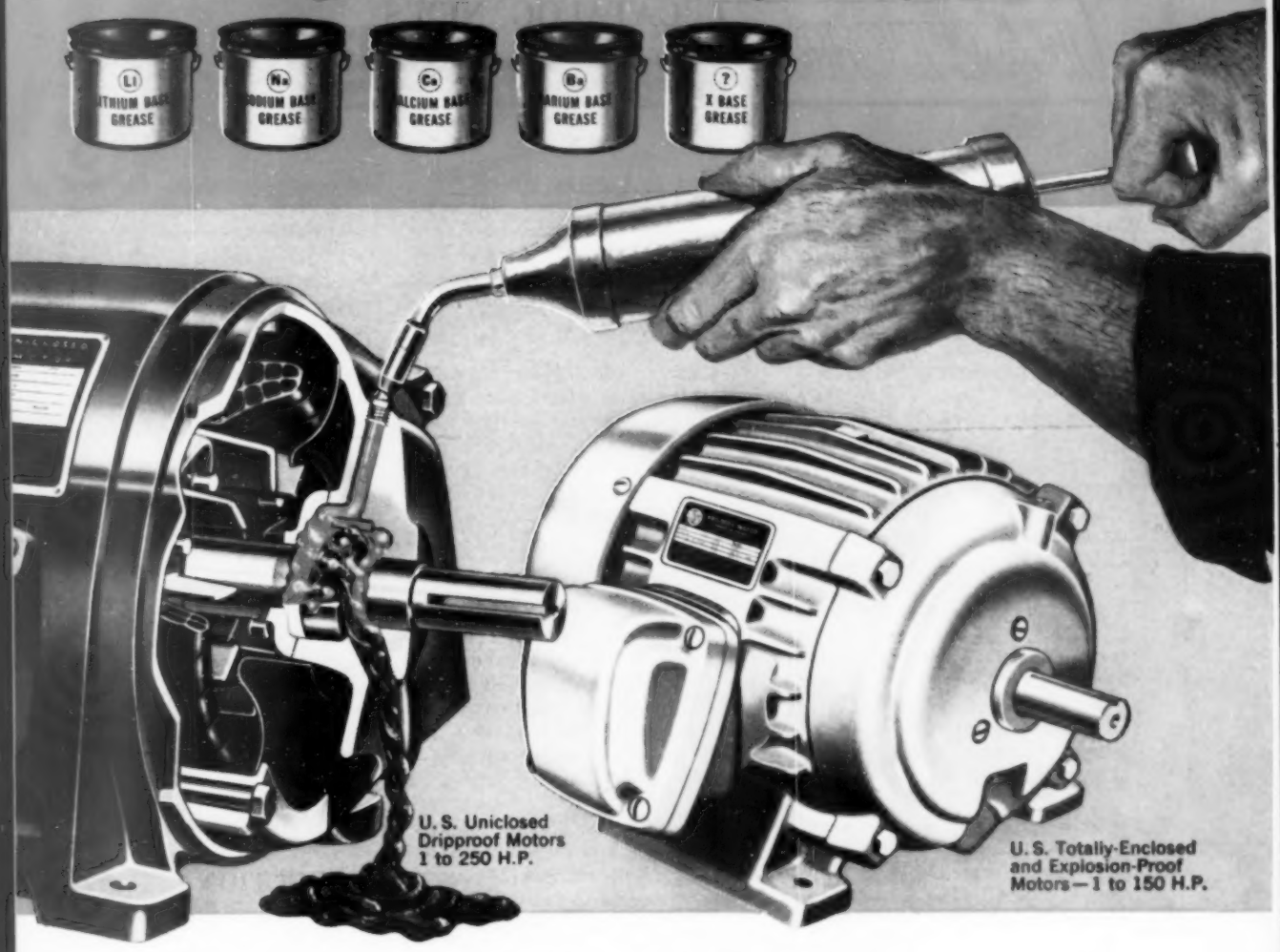
- Maintenance man-hour requirements are a small part of plant total.
- Company agrees to train maintenance workers and transfer them to better-paying jobs.
- Company brings in CM as employees retire—the normal attrition method where nobody gets fired.
- Maintenance operation is inefficient and running at a loss.
- Peak loads extend beyond ability of existing force to handle.
- Work must be done during vacation shutdown.

To sum up, try to minimize your labor relations problems with CM by anticipating them. Examine your union contract, study past practices, develop a good plant climate. Determine who will be displaced and prepare to do some *quid-pro-quo* trading. If you prefer, go to arbitration first, to make sure you don't have to trade. Finally, be sure to provide a hole in the CM contract so you can get out fast if serious trouble begins to brew. **END**

For more facts Circle 576 on Reader Service Card

For more facts Circle 577 on Reader Service Card ➤

modern greases are not always compatible...

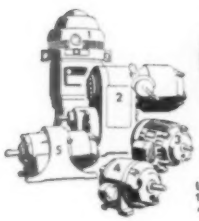


...that's why it's important to assure

complete flush *with* Lubriflush*

exclusive feature of* **U.S. MOTORS

Today's greases have many different chemical bases – lithium, sodium, calcium, barium, and others. Some of these chemical bases react when mixed, making mixed grease unsuitable for bearing lubrication. That is why U.S. LUBRIFLUSH – an exclusive U.S. feature – is so important. With LUBRIFLUSH transverse lubrication, new grease *completely* flushes out the old. No mixing! New grease may be put in without bothering to determine whether it's basically compatible with the grease already in the motor. LUBRIFLUSH, moreover, assures proper lubrication for *longest bearing life!* Another good reason to specify: "U.S. ELECTRICAL MOTORS."



U.S. MAJOR MOTOR LINES INCLUDE:
1. Vertical Solid & Hollowshaft, 2. Varidrive, 3. Totally-Enclosed, 4. Uniclosed, 5. Syncrogear. Also, many other special motors.

U.S. ELECTRICAL MOTORS INC.

P.O. BOX 2058, LOS ANGELES 54, CALIFORNIA
OR MILFORD, CONNECTICUT

FREE COLOR BROCHURE
for full information send for
FREE Lubriflush Bulletin.

FACTORY

CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

MATERIAL HANDLING

1—Electric Hoists. Here's a 12-page bulletin (H-113) with data on low headroom, heavy-duty hoists. Describes electric travel for hand cranes. Tables of ratings, dimensions; photo views of construction. *Northern Engineering Works.*

2—Turnover Cradle. This 4-page catalog tells how cradles automatically rotate and palletize coils weighing from 3000 to 40,000 lb. in less than one minute. Application photos show how operation is performed. *La Deau Mfg. Co.*

3—Vibratory Feeders. Catalog P.O. 51800 (32 pages) contains specs and other data for line of feeders designed for finger-tip control, low maintenance feeding of bulk materials. Shows installations, provides helpful application diagrams. *Syntron Co.*

4—Material Handling. The answer to more efficient material handling is given in illustrated 8-page equipment booklet (B-100). Shows Cargotainers, conveyor guard, pallets; also optional features for products. *Tri-State Engineering Co.*

5—Dumpers. Here's an 8-pager that describes four dumpers. Three of them lift, up-end, dump, and return the skip automatically. Equipment can be adapted to handle bags, boxes, bulk, and drums. Application photos. *Essex Conveyors, Inc.*

6—Lifting Magnets. Operating data and lifting capacities for magnets up to 80-in. diameters are given in 12-pager (No. 1300). Covers both all-welded and bolted models. Lists aids for magnet users. Photos. *The Electric Controller & Mfg. Co.*

7—Pneumatic Conveyors. Use of this equipment to handle pelletized rubber is explained in 4-page Fact File ER-30-1. Photos show step-by-step processing of rubber; also panel from which process may be controlled. *Fuller Co.*

8—Canvas Cushion Wheels. This 4-pager contains specs and other info about wheels especially suited for trucks that have to travel over rough floors. Wheels won't mar or smudge tile and other kinds of floors. *Divine Brothers Co.*

9—Casters. Catalog No. 159 (24 pages) contains description, specs, and photos of swivel- and rigid-plate track casters. Load capacities from 100 to 15,000 lb. Info on grease-sealed, V-grooved and other casters. *Faultless Caster Co.*

MECHANICAL

10—Belt Drive. Here's a 4-page bulletin (20B8760) that points out the advantages of timing belt drives. Suitable for load applications up to 600 hp., speeds to 16,000 fpm. Includes diagrams and photos. *Allis-Chalmers Mfg. Co.*

11—Gear Drives. Specs, dimensions, ratings, and assembly details are given in Bulletin 5904 (24 pages). Shows special units to 50,000 rpm. and 50,000 hp. Illustrates installations in many types of service. *Western Gear Corp.*

12—Gearmotors. This 48-page Book 2747, "Gearmotors, Motogears and Fluid Drives," describes various types of drives with selection data, dimensions, overhung load ratings, mountings. Also gives application info. *Link-Belt Co.*

PLANT SITES

13—New Jersey. "Near the crowd—but not in it!" is a 28-pager on the advantages of locating in Middlesex County. Covers living conditions, educational facilities, zoning, other details. Map, photos. *Middlesex County Industrial Dept.*

14—Wisconsin. "Wisconsin Facts for Industry" contains a wealth of information in 56 pages. Lists labor market areas, with manufacturers and principal products. Five helpful maps, too. *Wisconsin Division of Industrial Development.*

15—Georgia. Two spiral-bound bulletins give plenty of reasons for industry to start marching to Georgia. One booklet gives data on sites in various locations; the other sets forth info on low-cost construction. *Georgia Power Co.*

16—Allegheny County, Pa. Several booklets and maps tell all about the Allegheny industrial district. Describes sites just northeast of Pittsburgh, with info on transportation, labor supply, other angles. *Bessemer & Lake Erie R.R. Co.*

17—Florida. Lewis Terminals, located at Riviera Beach in the southern part of the state, is a planned industrial park. Colorful 10-page booklet discusses housing, climate, other details of the flexible development. *Lewis Terminals.*

PRODUCTION

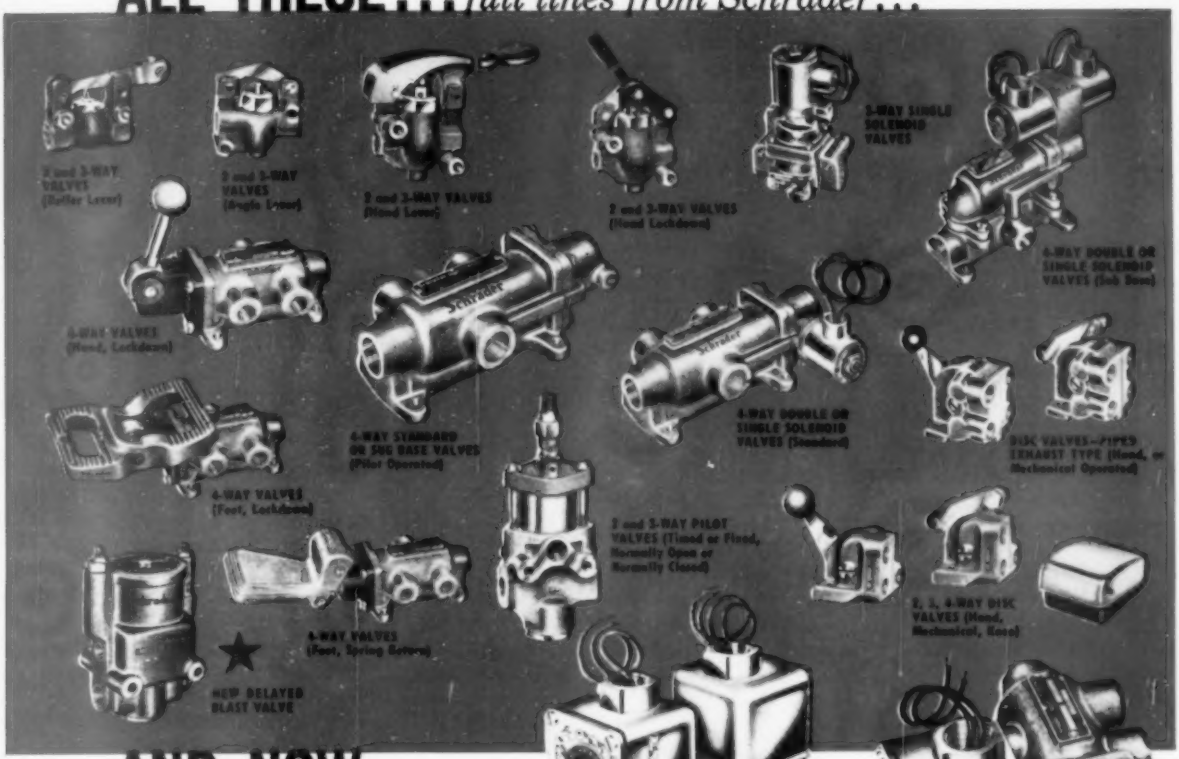
18—Computer Systems. Two catalogs: CPB-36A (12 pages) tells about digital computer for simplifying control systems. CPB-27 (10 pages) covers automatic data acquisition system for scanning sensing devices. *General Electric Co.*

19—Tube Flaring Machine. This 16-page catalog (1145-A16) describes the machine with a flare. Pneumatically operated, it forms a double lap flare on end of ferrous and non-ferrous tubing. Specs, other data. *Parker-Hannifin Corp.*

20—Vibrating Screens. Catalog No. 2777 (48 pages) presents large selection of vibrating screens—12 types in 212 sizes. Gives info on screen cloths and accessories; selection data. Cutaway photos show construction. *Link-Belt Co.*

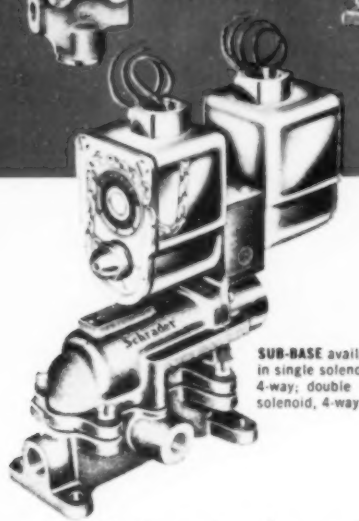
21—Gaging Products. Here's a 12-pager (No. 5913) on black granite gaging products. Features a selector

ALL THESE... *full lines from Schrader...*


3-WAY SINGLE SOLENOID VALVES
4-WAY DOUBLE OR SINGLE SOLENOID VALVES (Sub Base)
4-WAY DOUBLE OR SINGLE SOLENOID VALVES (Standard)
4-WAY STANDARD OR SUB BASE VALVES (Pilot Operated)
4-WAY VALVES (Foot, Lockdown)
4-WAY VALVES (Foot, Spring Return)
MFP DELAYED BLAST VALVE

AND NOW...

NEW JIC SOLENOID AIR VALVES



SUB-BASE available in single solenoid, 4-way; double solenoid, 4-way.

STANDARD BASE available in single solenoid, 3-way; single solenoid, 4-way; double solenoid, 4-way.

..... that meet and exceed JIC specifications

New JIC Solenoid Valves are compact, rugged, fast-and-easy to install. Roomy junction boxes fit space requirements with 90° rotation. Can be operated in case of current failure, by hand. Safe, recessed override button prevents accidental operation. Electrical system completely sealed against dust, oil.

Schrader's complete line of air valves allow you a freer hand in planning air circuits for your applications. Besides almost unlimited choice of size, style and actuation method, you get these extras in every Schrader valve you buy:

- All parts are designed for maximum air flow, longest service life; simplicity of replacement; interchangeability.
- Schrader Valves feature tough, practical design, precision construction, and are individually tested to full ratings.
- Performance has been proved by years of use in hundreds of plants. All Schrader Valves can operate with Schrader (JIC) Square End Cylinders perfectly.

Use the full Schrader line to do your air control selecting. Your Schrader distributor can help you pinpoint what you need. For more data write:

A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
457 Vanderbilt Avenue, Brooklyn 38, N. Y.

Schrader®
a division of SCOVILL

QUALITY AIR CONTROL PRODUCTS

For more facts Circle 578 on Reader Service Card

chart that lists 432 combinations of plate sizes, ledges, and over-all accuracies. Application photos. *The DoALL Co.*

22—Univac Computer. This 8-pager (U1218) is titled "The New Univac Magnetic Amplifier, Solid-State Computer." Explains "total systems" concept and applications it can unify into single processing procedures. *Sperry Rand Corp.*

23—Rotoblast Barrels. Design features and capacities for each size of the five heavy-duty series are given in Bulletin 705 (16 pages). Drawings and sketches show Rotoblast wheel construction. Illustrated case histories. *Pangborn Corp.*

24—Boring Tools. Catalog No. D-510 (20 pages) covers six interchangeable types of blocks, including throwaway carbide insert. Diameters are from ¾ to 17 in. Specs and selection data. *Giddings & Lewis Machine Tool Co.*

25—Metal Lathes. This 4-color 20-page catalog (Form AD-1177) describes new 10-in. lathe with variable speed drive and ¾-in. collet capacity. Designed to fill need for low-cost lathe to do heavy-duty work. *Rockwell Mfg. Co.*

26—Speed Lathes. Data on bench and floor-type lathes are provided in 16-page Catalog No. 580. Machines are used for polishing, lapping, deburring, and other secondary finishing work on metal and plastic parts. *Schauer Mfg. Corp.*

AUXILIARY

27—Pumps. Whatever the need, this 72-page catalog (DHCo606) on centrifugal and rotary pumps should fill it. Describes pumps for special conditions of temperature, viscosity, specific gravity. Photos, diagrams. *Detroit Harvester Co.*

28—Battery Chargers. Vertically mounted motor generator chargers that save up to two-thirds floor space are subject of 4-pager (Form 6259). Four sizes, 25 ratings. *The Electric Storage Battery Co.*

29—Lubrication, Coolant Systems. Bulletin 1451 (8 pages) describes custom-engineered and Unilube prefabricated lubrication systems. Has spec tables for oil reservoirs, pressure tanks. Lists component parts. Photos. *Dravo Corp.*

30—Rotary Pumps. Line of internal gear pumps covers four series for various types of plant services. Catalogs WI-102, 3, 4, 5 (all 4-pagers) give construction data, performance and dimension tables, drawings, photos. *The Wayne Pump Co.*

31—Manifolds for Gases—Illustrated Catalog 829 is a 24-pager that covers company's line of manifolds for industrial gases. Includes background material on advantages of manifolding, capacities, dimensions. *Air Reduction Sales Co.*

32—Condensation Pumps. Four types of vacuum return line condensation pumps for heating systems are presented in No. J-200 (12 pages). Lists horizontal and vertical models with special and standard capacities. *C. H. Wheeler Mfg. Co.*

ELECTRICAL

33—Light Control Systems. Importance of right light for every task is discussed in 28-page illustrated Catalog SE-12589. Highlights three determining factors: foot-candles, reflectance, unit of brightness. *The Superior Electric Co.*

34—Thinline Motor. Bulletin GEA-6927 (8 pages) describes new motor for limited space applications such as machine tools, fans, blowers. From one to 5 hp. Chart of interchangeable flange dimensions, other data. *General Electric Co.*

35—Mercury Switches. Revised Catalog 90B, 12 pages, presents data on standard line of switches for a-c or d-c use. Six types: general use, low angle, small size, pulse, heavy duty, enclosed. Shows contact arrangement. *Micro Switch.*

36—Rayescent Lamps. This 4-pager (Rev.RL-1) describes flat "light bulbs." Lamps consist of sheet of glass with electrical conductive coating and phosphor layer. Standard sizes from 2- to 24-in. square. *Westinghouse Electric Co.*

37—Unit Substations. Completely packaged, compact substations called Tranfo-Units are discussed in Bulletin R5604-1A (16 pages). Units consist of transformer with primary and secondary switchgear to permit voltage stepdown at load area. *I-T-E Circuit Breaker Co.*

38—Meter-Relays. How and why the A.P.T. meter-relay operates is subject of Bulletin S-1 (4 pages). Describes features that give control reliability. Lists other products—panel meters, packaged controls, etc. *Assembly Products, Inc.*

39—Electrical Connectors. Plugs and receptacles that are moisture-proof, shock-insulated, dust-tight, corrosion-resistant are featured in Bulletin 2711 (48 pages). Operate in temperature ranges from −80 to +225 F. *Crouse-Hinds Co.*

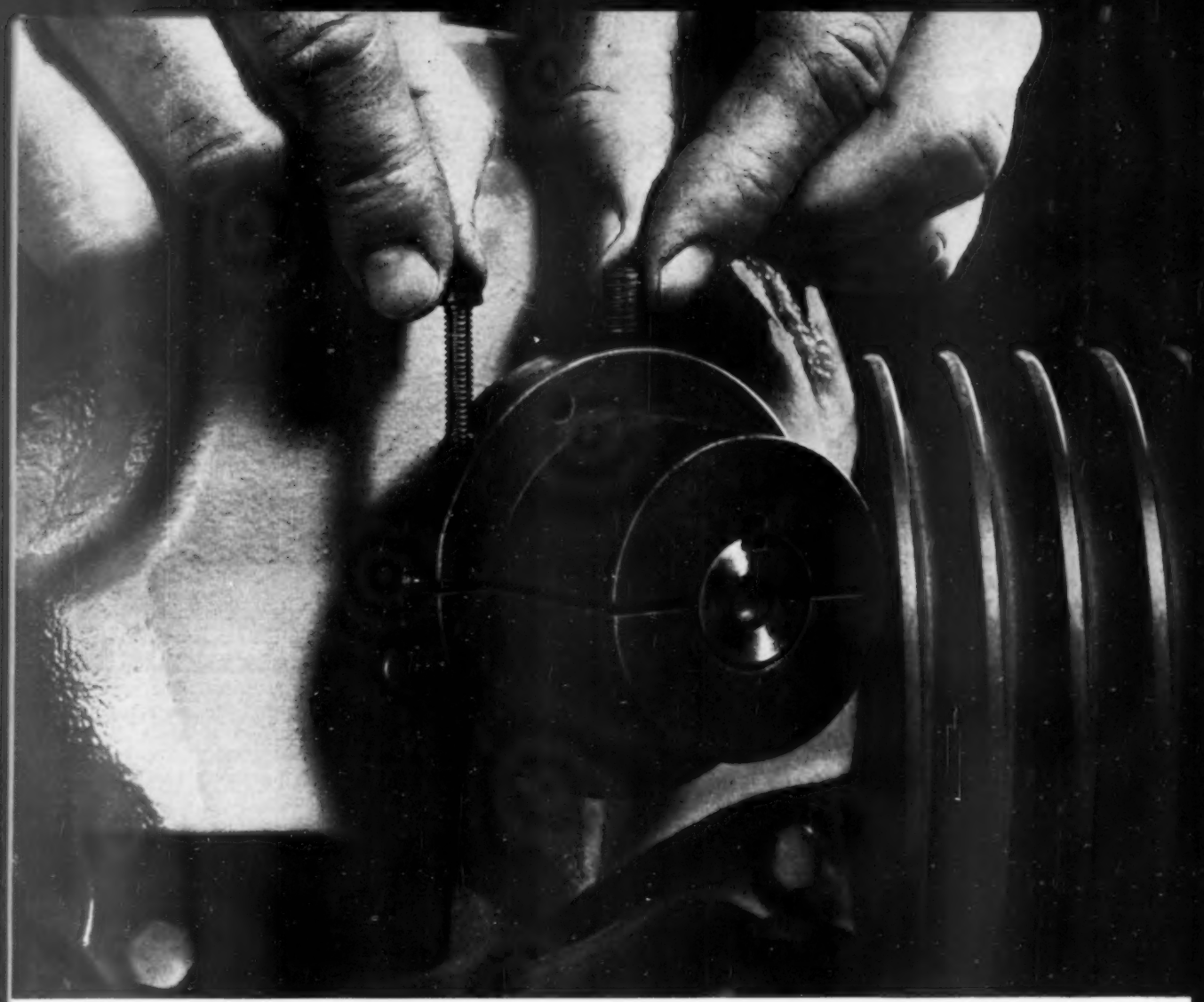
40—Wiring Devices. This 12-page illustrated catalog discusses plastic duct-wiring systems that are easy to assemble and install—and just as easy to take apart and reassemble. Info on end and back connected types. *A. H. Massey, Inc.*

41—Connectors. Bulletin B73 (12 pages) lists general features and defines terms and references used in describing connectors. Styles include oval and round push-pull, round push-latch, quik-loc, change-out, others. Photos. *Joy Mfg. Co.*

42—Motors. This 8-pager (2650) covers line of a-c, d-c standard and special motors, gearmotors, and adjustable speed drives. Summarizes characteristics and modifications for 20 basic types of motors and drives. *The Louis Allis Co.*

43—Motor Controllers. Two classes of oil-immersed squirrel-cage starters (2000-5000 volts) are described in 4-pager (14B8750). Includes construction details, test results, specs, outline dimensions. Photos. *Allis-Chalmers Mfg. Co.*

Turn the page



Announcing Worthington QD Sheaves with the

GOLDEN SCREWS

To demonstrate to you that the exclusive two-screw design is practically worth its weight in gold, all Worthington QD (Quick Detachable) sheaves now have two golden screws.

The clamp screw simplifies installation and assures permanent alignment. You can install QD sheaves one part at a time. No heavy rim and hub combination to delicately inch into place. You just slide the hub on the shaft and permanently lock it in position with the clamp screw. Then you slide the sheave rim into position on the hub. This job is simplified because you engage the large end of the sheave with the small end of the hub. To change speed you simply install another sheave on the hub which remains anchored to the shaft by the clamp screw.

The set screw prevents "key drift." It locks the key securely in place, avoiding the danger of the key drifting off and becoming a safety hazard. This feature is appreciated by plant operators who first brought this potential danger to Worthington's attention.

You tighten the set screw without distorting the hub. The clamp screw allows you to locate the hub on the shaft. The locked hub then permits you to tighten set screw on key without distortion.

You can get Worthington QD sheaves anywhere in the U.S. More than 350 distributors carry Worthington sheaves and Worthington-Goodyear Green Seal V-belts. For your copy of a 100-page Multi-V-Drive Manual on how to select the right sheave and V-belt write to Worthington Corporation, Section 79-15, Oil City, Pennsylvania. In Canada: Worthington (Canada) Ltd., Brantford, Ontario.

WORTHINGTON

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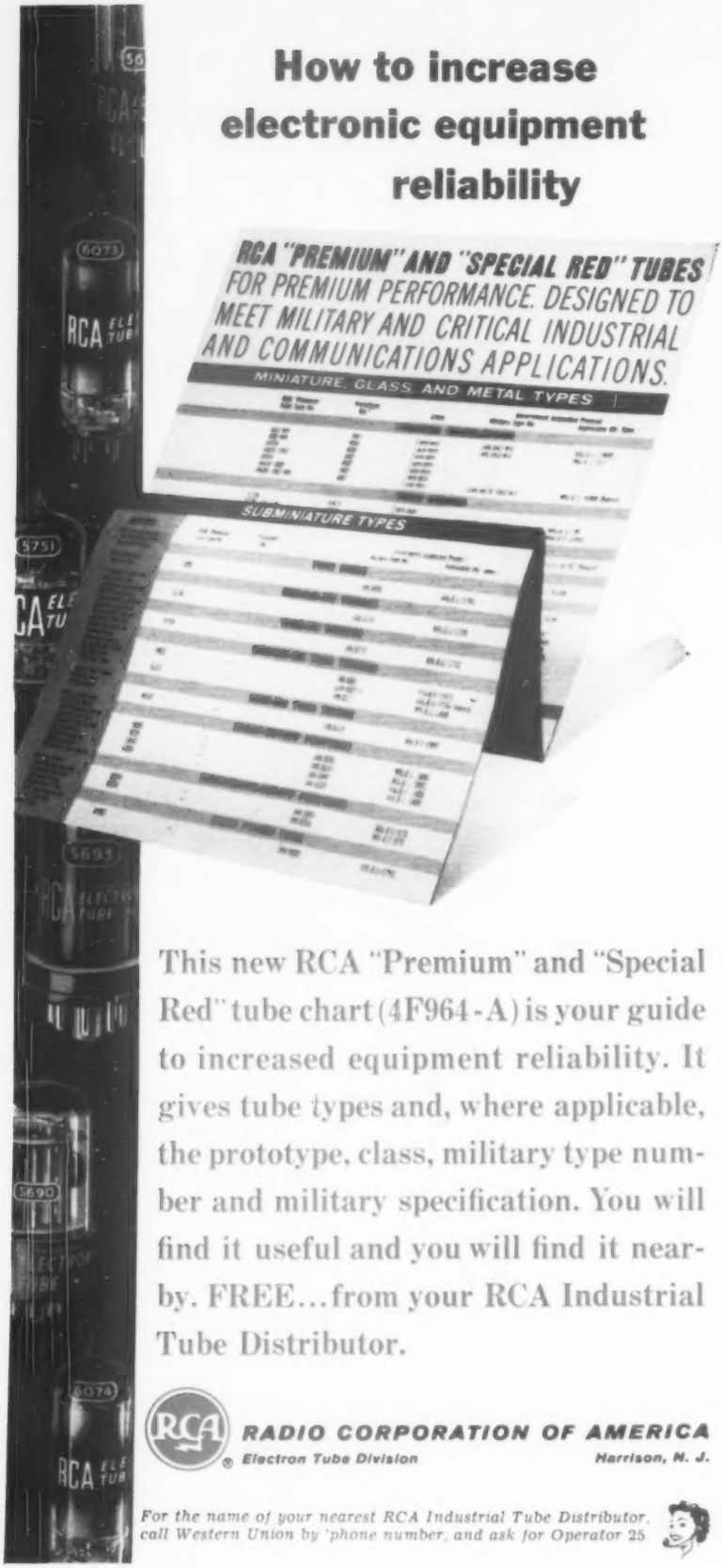
How to increase electronic equipment reliability
RCA "PREMIUM" AND "SPECIAL RED" TUBES FOR PREMIUM PERFORMANCE. DESIGNED TO MEET MILITARY AND CRITICAL INDUSTRIAL AND COMMUNICATIONS APPLICATIONS.
MINIATURE, GLASS, AND METAL TYPES
SUBMINIATURE TYPES
This new RCA "Premium" and "Special Red" tube chart (4F964-A) is your guide to increased equipment reliability. It gives tube types and, where applicable, the prototype, class, military type number and military specification. You will find it useful and you will find it nearby. FREE...from your RCA Industrial Tube Distributor.
RADIO CORPORATION OF AMERICA
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For the name of your nearest RCA Industrial Tube Distributor, call Western Union by 'phone number, and ask for Operator 25

FACTORY / CATALOG NEWS

Begins on page 216

For more about these items, circle item numbers on Reader Service Card next to back cover.

AIR HANDLING

44—Duct Fans. Construction and performance data are given for belt- and direct-drive, bi-pass, and reversible duct fans in Bulletin A-114A (12 pages). Has visual index; info on corrosion-resistant materials. *Hartzell Propeller Fan Co.*

45—Air Purification Equipment. Bulletin 108A (12 pages) covers Dorex activated carbon air purification equipment. What it is, what it does, and where it's used is described with specs, dimension tables, photos. *Connor Engineering Corp.*

46—Gas-Fired Unit Heater. Construction features, dimension and rating tables, other technical data on heaters are given in Bulletin GU-100 (4 pages). No piping or boiler equipment is necessary. Drawings, photos. *L. J. Wing Mfg. Co.*

47—Electronic Air Cleaner. Here's a 16-pager (No. 294A) that explains electronic principle and operation of company's air cleaner. Needs no water, washing, drains, oiling of plates; has no freezing problems. *American Air Filter Co., Inc.*

MAINTENANCE

48—Vibration Noise Control. This 8-pager (K4E) gives engineering specs and performance data for 27 products for control and measurement of machine vibration, shock, and noise. Photos. *The Korfund Co.*

49—Boiler Steam/Pure Water. Bulletin No. IN201 (8 pages) describes system for economically producing sterile water from boiler steam. Diagrams, specs, capacity and accessory info. *Wilmot Castle Co.*

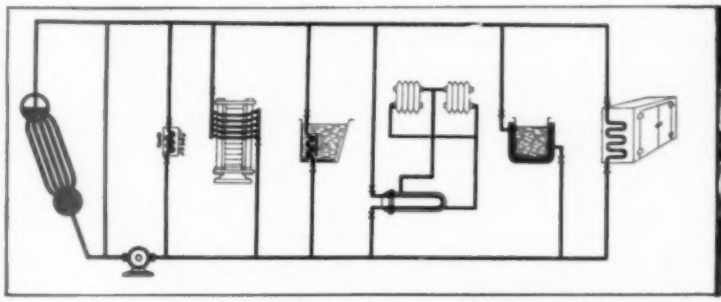
50—Coating Chart. Helpful chart, "Comparison of Maintenance Coating Systems," includes grading key and notes. Compares 17 standard systems, showing strong and weak points of each. *Carboline Co.*

Turn the page

ROSS
Air Systems

Engineered
Atmospheres
for Better
Processing

Ross metal decorating baking oven



Schematic layout of typical Supertherm high pressure water system to replace **uneconomical** existing process and comfort heat system

Ross foam rubber curing oven

Modernization

...THE ANTIDOTE FOR A POISON AFFLICTING MANY COMPANIES

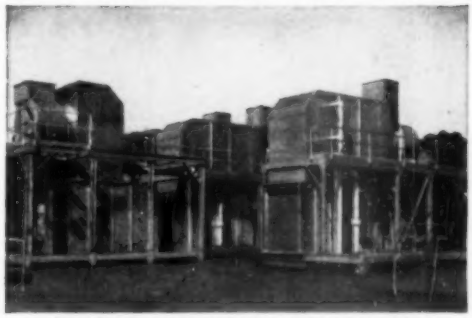
The poison? Obsolescence! The use of a machine that is past its 'point of no return' may not show up too strongly in your unit cost structure now but its cumulative effect is devastating. It's slow poison...slowly sapping the production strength of the user. The longer an obsolete unit remains in service the greater is the unit cost gap between the old and what a modern unit would do. If you have obsolete equipment you are in a slowly deteriorating competitive position.

OPERATIONS WHERE MODERNIZATION WILL PAY OFF!

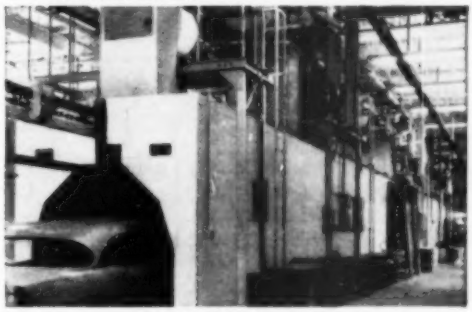
Paint Finishing • Washing, Drying, Baking, Curing • Conversion Operations • Process Heating • Air Heating • Air Distribution; Fans; Ducts; Nozzles • Industrial Air Conditioning • Heat Recovery

Any process that needs its components brought up to date so that they conform to the modern practices and make use of the latest in design.

Why not check all operations in your plant that directly or indirectly involve what we call the 'Engineered Atmosphere'? Ask a Ross Specialist to make a study of the systems, equipment and auxiliary units to determine just what *is* obsolete. He will submit a detailed report as to which should be modernized to bring about the greatest reduction in unit costs. His report will be based on his broad knowledge of 'Engineered Atmospheres' and years of experience in designing the equipment and systems noted in the accompanying list.



Ross-Briner economizer; aluminum construction for roof installation



Ross paint finishing oven

Resin core stock oven

THE MIDLAND-ROSS GROUP OF COMPLEMENTING SERVICES

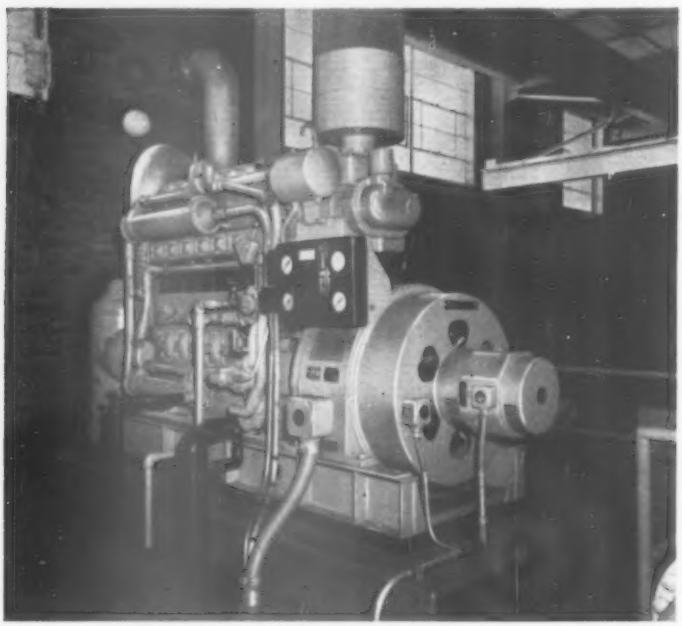
J. O. ROSS ENGINEERING
Division of Midland-Ross Corporation

730 Third Avenue, New York 17, N. Y.
ATLANTA • BOSTON • MT. PROSPECT, ILL.
DETROIT • LOS ANGELES • SEATTLE

For more facts Circle 581 on Reader Service Card

Picture of O-P economy!

Ohio pumping station saves $300 a month using **F-M** Opposed-Piston standby diesel for both power generation and pumping



Compact, lightweight Model 38F5¼ O-P is rated 450 hp. at 1200 rpm., direct drives a 175-kw. F-M alternator and, through right-angle gears, an F-M Pomona Vertical Turbine Pump with 5.5 mgd. capacity at discharge pressure of 105 psi.

Electric power off the flywheel end, high-service pumping off the front—that's the standby job cut out for this Model 38F5¼ Fairbanks-Morse O-P Diesel in the Elyria, Ohio water works serving 60,000 people.

Called into service for 3 to 6 hours a day in the Spring of 1958, the O-P pumped water for $1.50 less per million gallons than purchased power—a $300 per month reduction, including savings on demand charges. Each Saturday the engine makes a test run as the sole high-service on the line.

Versatile as well as economical, the Model 38F5¼ O-P is also ideal for direct-driving other equipment off the rear, with front end of shaft driving an auxiliary generator, crusher, pump, etc. The O-P can be furnished for either diesel, dual-fuel, or spark-ignited operation, and is available as a complete packaged unit with all accessories attached to the frame. Write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL, DUAL FUEL AND GAS ENGINES • LOCOMOTIVES • ELECTRIC MOTORS • GENERATORS
PUMPS • SCALES • COMPRESSORS • MAGNETOS • HOME WATER SYSTEMS

FACTORY / CATALOG NEWS

Begins on page 216

For more about these items, circle item numbers on Reader Service Card next to back cover.

51—Drafting Equipment. In addition to showing drawer files, drafting tables, and the like, Catalog GC (24 pages) illustrates new "file and find" storage system for large rolled blueprints, charts, drawings, etc. *Stacor Equipment Co.*

52—Drills, Counterbores. No. 359 (68 pages) contains data on drills, drilling processes. Covers drill reconditioning, drilling speeds and feeds, jig drilling, how to drill difficult-to-machine materials. *Cogsdill Twist Drill Co., Inc.*

53—Filter Elements. Here's a 4-pager (BFD-48) that describes nine basic filter element materials for air, gas, and liquid filtering requirements. Tells methods of rating and testing filter assemblies. *Bendix Aviation Corp.*

54—Pushbutton Scaffold. All-aluminum pushbutton elevating work platform, called a Televator, is discussed in 4-pager. Unit's advantages: one-man operation, mobility, height adaptability. Photos. *Reynolds Televator Corp.*

55—Lubricant Selector Chart. Bulletin 121 (4 pages) is a convenient guide to the proper lubricant for most extreme pressure jobs. Evaluates all lubricants in the company's line. *The Alpha-Molykote Corp.*

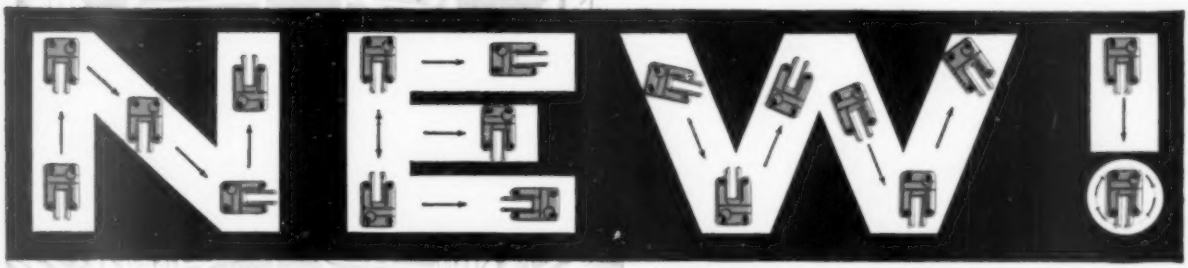
VALVES AND PIPES

56—PVC Valve. What is said to be the first all-molded corrosion-resistant valve is described in 6-pager (No. 601). Gives sizes, weights, dimensions of screwed and socket end valves, installation and other data. *Lunkenheimer Co.*

57—Three-Way Valves. Bulletin 8F (8 pages) has info on heater bypass valves for regulating boiler feedwater flow. Includes sectional drawings of design features, construction, operation, application data, photos. *Schutte and Koerting Co.*

Turn the page

AUTOMATIC
Introduces 2 New Trucks
to speed up materials handling...cut costs!



New CRAB TRUCK

Maneuvers in all directions

Here's the answer to your dream for unusual aisle operations. All-directional steer allows truck to move in any direction, at any angle, with any type of load! The Crab Truck with 65-inch length can turn completely around in a 70-inch circle. Bulky, odd-shaped loads can be loaded across the forks and moved sideways down the aisle. Placing and positioning load is done by a reach-type fork attachment which can swing load 30° each side of center. Capacities: 2,000 thru 4,000 lbs.

SKYLIFT Model ELF

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Costs less to operate

New motor and control give smooth, quiet acceleration through entire speed range...save up to 50% of battery power during maneuvering operations. Compact design and fast travel and lift speeds make the ELF ideal for plants and warehouses that require a highly maneuverable truck for heavy loads. Large battery compartment accommodates power supply for toughest jobs. Convenient finger-tip controls reduce driver fatigue. Capacities, 4,000 thru 10,000 lbs.

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Electric Automatic Industrial Trucks

WORLD'S LARGEST EXCLUSIVE BUILDER OF ELECTRIC-DRIVEN INDUSTRIAL TRUCKS

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In OLD Industrial Country

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Bristol is at mid-point of the Southern industrial complex, equidistant between New York and Mobile, Ala., and between Chicago and Jacksonville, Fla. There is overnight delivery of most metals from Birmingham, and New York City is but 24 hours haul by rail or motor freight.

Bristol is the junction point of the Southern Railway System and the Norfolk and Western Railroad, allowing for unusual advantage in receiving and shipping. It is astride the freight rate boundary, making for unusual savings in the delivery of your finished product.

Motor freight facilities are excellent, a barge terminal is only 120 miles away and airline service at nearby Tri-Cities Airport is adequate and convenient.

You're close to Bristol, Tenn.-Va., already; why not come on down and enjoy its advantages?

Let Ford, Bacon & Davis
Tell You the Whole Story

This nationally famous engineering firm has prepared an exhaustive analysis of Bristol's industrial potential. Write for your copy today—Dept. F759.

Bristol
INDUSTRIAL DEVELOPMENT BOARD
of the Twin Cities of
BRISTOL • TENN. - VA.

FACTORY / CATALOG NEWS

Begins on page 216

For more about these items, circle item numbers on Reader Service Card next to back cover.

58—Steam Specialties. No clams! But everything in company's line of valves, floats, and traps is presented in 12-pager (No. 203). Discusses outstanding features, construction, and operation of each unit. *American Air Filter Co.*

59—Hose Valves. This 4-pager discusses improved rubber-covered hose valves. New one-piece body construction is said to add strength and rigidity to this equipment. *P-K Industries, Inc.*

60—Gas Flow Control. Catalog 806A (12 pages) shows operation and applications for control equipment for argon, helium, carbon dioxide, other gases. Lists principal products; diagrams and photos of fittings. *Air Reduction Sales Co.*

61—Integral Steam Tracing. Two booklets: An 8-pager describes new components designed to simplify unique piping applications. A 25-page report, with 18 drawings, shows installation of piping systems. *Aluminum Co. of America.*

INSTRUMENTS AND CONTROLS

62—Control Panels. Bulletin No. 170 (12 pages) describes three basic panels—Model SE, sequences engine control; SEC, fully automatic engine and compressor control, SEC-R, fully automatic control for remote location. *Clark Bros. Co.*

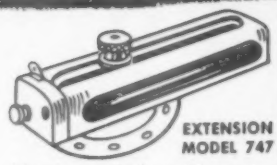
63—Control Systems. Illustrated 4-pager explains how control panels can help build compactness and reliability into complex systems. Lists uses by industry, gives application data. *Control Panel Corp.*

64—Tape Control Positioning. Here's a 10-pager (Form LO-5902) that tells how this positioning reduces set-up, tool changes, jig or template cost. Explains retrofitting (or do-it-yourself) applications. *Jones & Lamson Machine Co.*

"ON-THE SPOT" EFFICIENCY

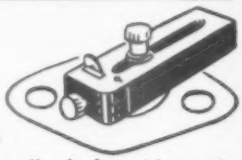
SPEARHEAD GASKET CUTTERS

HAND • TOOLS



EXTENSION MODEL 747

Aluminum body with steel blades and inch and metric scales. Cuts precision round gaskets any size



HANDY MODEL 750

Phenolic body with steel blades and inch and metric scales . . . cuts round gaskets ¼" to 6", odd shapes and straight pieces any size

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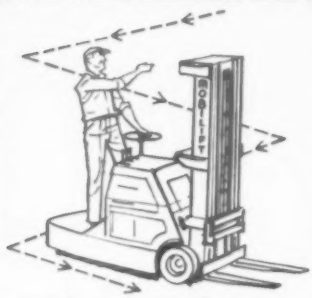

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and the Mobil-Matic transmission. He will tell you it means day-after-day, easy-to-operate control on both stand-up and sit-down models.

Look us up in the Yellow pages or write today for further details!

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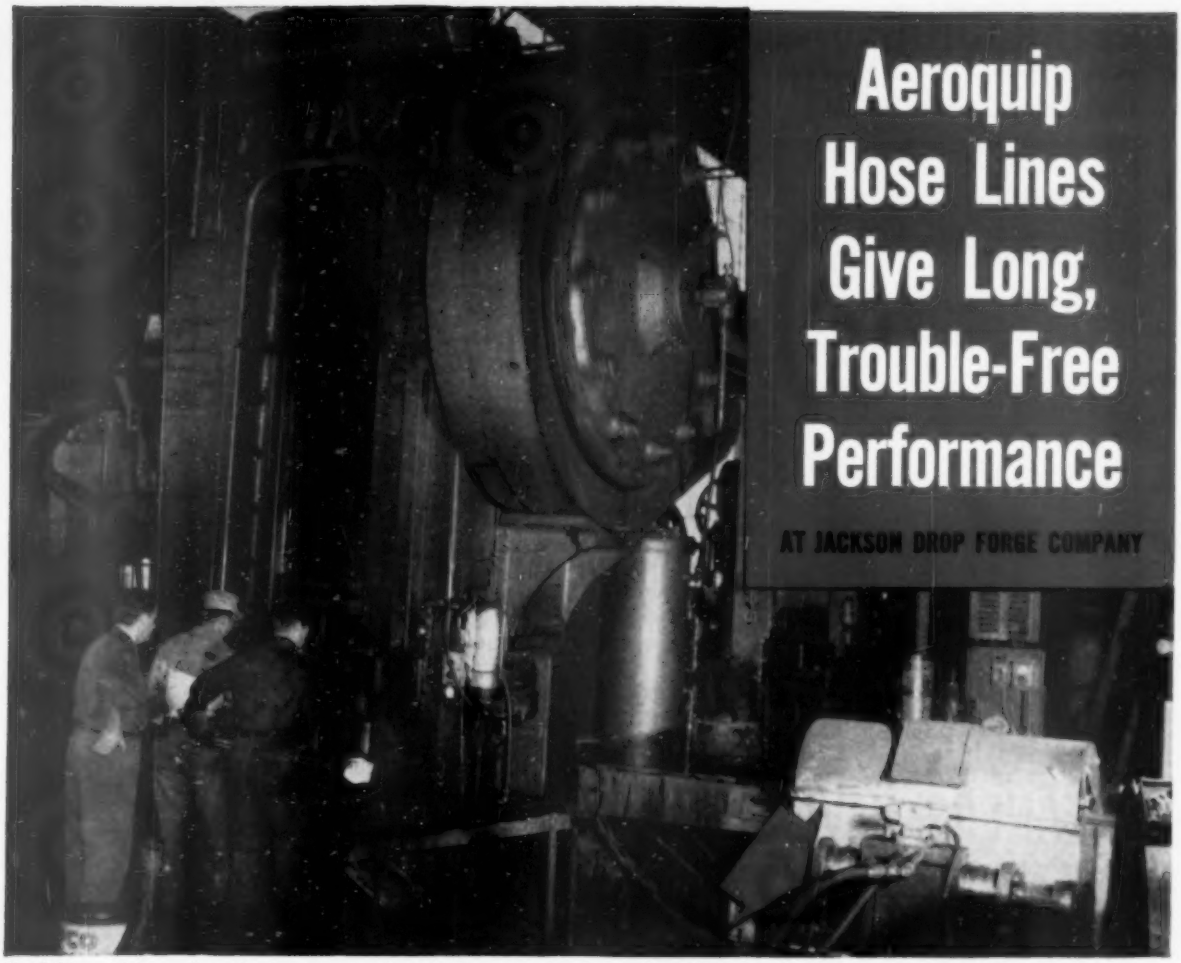
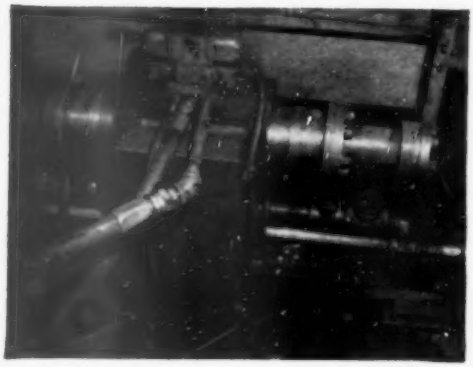
Circle 586 on Reader Service Card

Aeroquip Hose Lines Give Long, Trouble-Free Performance

AT JACKSON DROP FORGE COMPANY



Hot billets withdrawn from the furnace pass through the water descaler at the right before forging. Arrow points to Aeroquip Hose Lines.



Aeroquip 1509 High Pressure Hose Lines on the billet descaler are subject to hydraulic pressures up to 2,500 psi.

Rugged Aeroquip 1509 Hose Lines in Good Condition After 2½ Years on Billet Descaling Unit

Use of high quality Aeroquip Flexible Hose Lines assure full service life of fluid lines on all types of metal-working equipment.

At Jackson Drop Forge Company, Jackson, Michigan, Aeroquip 1509 Hose Lines have performed well on the high pressure hydraulic systems used on special billet descalers. These hose lines withstand pressure surges, heat, oil soaking and vibration. They are in good condition after 2½ years' service.

Whatever your fluid system requirements, you can depend on your Aeroquip Distributor to provide replacement hose lines that will do the job. Call him today; he's listed in your Yellow Page Phone Directory.

Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
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The Multipower transducer developed by Acoustica research, multiplies the power and efficiency of ultrasonic action. Cleaning is faster, better, labor costs are lower. Acoustica ultrasonic cleaners are built for performance and durability. They are engineered to the finest standards, unequaled in quality and value.

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226 **Circle 588 on Reader Service Card**

FACTORY

BOOKS

By WARREN J. KING, Manager
Features and Departments, FACTORY

Latest in Lighting Levels

This third edition of the Illuminating Engineering Society's *Lighting Handbook* comes at an appropriate time. Lighting standards have been in turmoil for the last two years following initial release of evidence that existing standards were far below optimum levels. Now the *Handbook* combines all these updated data in an 1100-page package.

Studies resulting in new and dynamic lighting developments have been conducted over the last several years under the direction of Dr. H. R. Blackwell at the University of Michigan's Vision Research Laboratories. Here a great many typical visual tasks were studied to determine the minimum brightness levels needed for optimum eye performance. From these brightness data, I.E.S. engineering committees determined acceptable standards for lighting levels in homes and in industrial, commercial, and public buildings. All this work was made possible by a grant to the University from the Illuminating Engineering Research Institute.

These new foot-candle tables are published in full for the first time in the *Handbook*. New classifications for specific types of industrial locations have been added where old designations were too broad. Almost without exception, old levels have had to be raised. If you haven't followed the big change in lighting standards in the last two years, some of the new "minimums" may knock your hat off. Here are a few examples:

Foundry pouring and structural steel assembly floors with 10 foot-candles used to be considered well lighted. Today nothing less than 50 foot-candles will do. Rough machine shop areas now need 50 foot-candles compared to a former 20. And medium accuracy assembly areas now need 100 foot-candles compared to 50 in the past.

All sections of this all-inclusive book have been revised since publication of the last edition in 1952. Over 700 I.E.S. members and 34 technical committees did the job. Divided the content into three major categories, which are well-indexed and cross-indexed. The first section deals with basic reference information on physics of light, color, etc. The second with lighting calculations. And the third with lighting applications.

There's nothing available on lighting as authoritative or complete as the Society's own *Handbook*. Anyone whose job calls for an understanding of lighting principles and applications needs this modern and competent work.

I.E.S. Lighting Handbook, Illuminating Engineering Society, 1860 Broadway, New York 23. 1100 pages. $10.

Take a Fresh Look at Development

Looking for a fresh viewpoint for your management development program? You'll find it in Willard Bennett's *Manager Selection, Education and Training*. Don't be stymied by the title. Because the author (he's responsible for all training at Cities Service Refining Corporation) advances the most intelligent, stimulating, and visionary thesis for management development that FACTORY editors have seen. And it's all as sound as a dollar.

Bennett does much more than tick off techniques for the professional trainer. He has developed a framework for action that plant management people will find especially refreshing. You can find help and guidance in pursuing his three-step plan: (1) Selection—identification of management potential and its degree; (2) Intellectual Conditioning—adult education in the academic substance of the profession, and (3) Supervised Training—guided application of this knowledge in practical events of daily occurrence.

If you're old-fashioned, Bennett may step on your toes. His opinions

THERE MUST BE AN EASIER WAY

SAME OLD GUESSING GAME EVERY DAY— "DRAWING, DRAWING, WHO'S GOT THE DRAWING?"
ANY OF YOU GUYS SEEN THAT HOOTAN HOLLER DRAWING A-6105?
HE SAYS I FILED IT WRONG
I'LL LOOK IN THE WASTEBASKETS AGAIN
DIDN'T WE THROW THAT OUT THE WINDOW WHEN THE PARADE WENT BY?
I THINK SOMEONE TOOK IT OUT TO THE COAST OR SOMETHING
WE WON'T HAVE ANY DRAWINGS LEFT IF WE DON'T CALL IN A BLUEPRINTER AND ORDER AUTOPOSITIVE PAPER INTERMEDIATES.

Much easier for you when you have your local blueprinter—or your printroom—make intermediates of your drawings on Kodagraph Autopositive Paper.

That simple act lets you file away your valuable originals safely in the vault. And there they can rest until you need more Autopositive Paper Intermediates to replace any you may lose.

Your Autopositive Paper Intermediates—with dense black photographic lines on clean, white, translucent background—take the place of originals in drafting and printmaking. They won't smudge or smear. Yet you can make drafting changes at will. And after doing so, you can make "Autopositives" from "Autopositives". . . get brand-new, ink-like "drawings."

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The cost of these intermediates is trifling compared to the savings in drawing protection and drafting short cuts—not to mention the higher print quality obtained.

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are controversial. But they are based on broad experience and demonstrated success.

Manager Selection, Education and Training, by W. E. Bennett. McGraw-Hill Book Co., 330 West 42nd St., New York 36. 210 pages. $6.

Automation's Impact

Automation and Society covers the effect of industrial mechanization on every aspect of our lives. The 32 well-known contributing authors of individual chapters examine present impact and future implications. The over-all study falls into three broad headings covering the evolution of the concept and method of automation, application to critical industries, and the social and intellectual influences.

Automation and Society, edited by Howard Boone Jackson and Joseph S. Roucek. Philosophical Library, 15 East 40th St., New York 16. 553 pages. $10.

* * *

Company Climate and Creativity. More than 100 leading authorities on creativity contributed to this book. It offers the first comprehensive study on the effect of internal company "climate" on its creative technical people. *Prepared by Deutsch and Shea, Inc. Industrial Relations News, 230 West 41st St., New York 36. 103 pages. $10.*

Fringe Benefits. It's an all-inclusive coverage of their history, cost, and economic significance. Although written from the management point of view, it gives a noteworthy account of the impact of these benefits. *By F. M. Wistert. Reinhold Publishing Corp., 430 Park Ave., New York 22. 155 pages. $3.75.*

The Language and Symbology of Digital Computer Systems. With the growing use of computers in the plant, this book is a good reference for the man not familiar with basic computer characteristics. *Prepared by RCA Service Co. Government Service Dept., RCA Service Co., Camden 8, N. J. 114 pages. $2.*

Tight spots, low clearance . . . no problem for highly maneuverable A-W 210 hydraulic crane . . . shown here speeding installation of new continuous wiredrawing machine in John A. Roebling's Sons mill, Roebling, N. J.

Versatility, maneuverability of A-W 210 cranes save time, labor in N. J. plant

"The outstanding performances of our Austin-Western hydraulic cranes and the many new uses to which they are constantly put continues to amaze us." That's what F. A. French, chief plant engineer at John A. Roebling's Sons, says about his company's two Austin-Western cranes.

Save many times cost

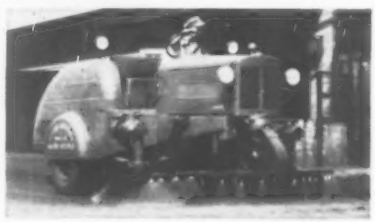
He adds, "The cranes have saved us many times their cost. One once did the work of a heavier electric crane which was out of commission for 3 weeks. Without the A-W the entire mill would have been down. I hardly know how we'd operate the plant without them anymore.

"A month doesn't go by without someone saying, 'You ought to see what we're doing with the A-W now!' The cranes are tremendous time and labor savers. Their maneuverability is amazing. There doesn't seem to be any place our operators can't take the A-W's with all-wheel steering.

"They are such useful pieces of equipment that they're kept busy on all three shifts and yet they require only normal maintenance."

3 models now available

Austin-Western hydraulic cranes are available now in three models: the 210 basic self-propelled rubber tired unit with 18-ft. telescoping boom which rotates in a full circle; the 210-P for truck and stationary mounting; and the model 220 with counterweighted boom for greater lifting capacity. Choice of gas or diesel power. A wide range of optional equipment offers added versatility. Learn how you can save time and labor for greater profit with A-W hydraulic cranes. See them at your nearest A-W distributor's or write us today for full information.



Plant cleanup is no problem with an A-W sweeper on the job. Available in two sizes—2-yd. Model 40 and 4-plus-yd. Model 60.

Austin 100th YEAR Western
CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.
BALDWIN · LIMA · HAMILTON
Power graders • Motor sweepers • Road rollers • Hydraulic cranes

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Handle Any Adjustable-Speed Job with One of these Square D "packages"*

One of 13 CUSTOM DRIVES for an automotive plant for control of 6 miles of monorail conveyors

* a Square D "package" includes the power conversion unit, operator's station, and drive motor

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employ advanced designs using more static elements and less tubes. Fail-safe circuits prevent motor runaways. Available in sizes from 1/20 H.P. through 40 H.P.

STATIC POWER MAGNETIC AMPLIFIER DRIVES

provide top reliability and simple maintenance. Save both floor space and weight as compared to conventional drives. Available in sizes through 400 H.P.

MOTOR-GENERATOR DRIVES

use static regulators and rectifiers for simplified maintenance. Rugged, heavy-duty components are provided in each drive. Available in sizes through 400 H.P.

CUSTOM DRIVES

for every possible adjustable-speed requirement can be designed for you using combinations of the above units, plus special units, with accuracies to fractions of 1%. The answer to your adjustable speed problem is as near as your Square D field office.

No matter what adjustable-speed requirements you may have, you can select a Square D drive to meet them exactly. Moreover, every component—from control to drive motor—is subjected to a complete electrical test, and the entire drive is test-run at the factory to assure top performance on the job.

Write for complete details. Ask for Adjustable-Speed Bulletin. Square D Company, 4041 North Richards St., Milwaukee 12, Wis.

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NUTLEY 10, NEW JERSEY — Representatives in Principal Cities

"Complete Semiconductor Power Conversion Systems for any AC to DC application."

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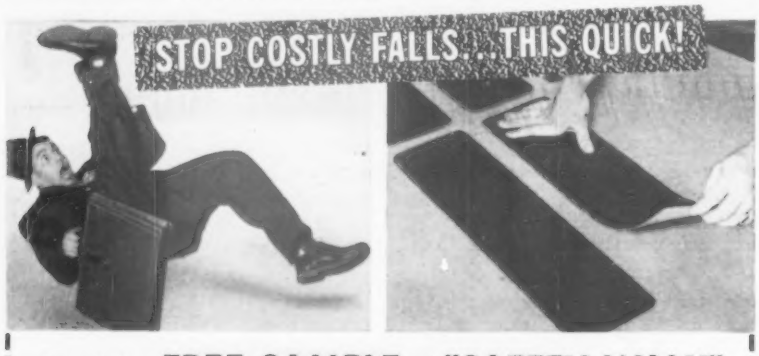

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"SAFETY-WALK" is a registered trademark of 3M Co., St. Paul 6, Minn.

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. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

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FACTORY FILMS

One Hoe for Kalabo demonstrates what machine tools are and the importance of machining operations in the manufacture of things we use every day. Film begins with shots of a tiny village in Africa where natives dig bog iron ore, smelt it in a primitive furnace, and produce at day's end a small chunk of iron out of which they pound a single hoe. Then, in contrast, power-driven tools are shown cutting and shaping many types of articles. 16mm, sound, color, 27½ min. Write to:

Modern Talking Picture Service, 3 East 54th St., New York 22.

Muscles of Control shows how control valves are engineered, how they function. Uses animation technique to reveal what happens inside a valve body under normal and extreme operating conditions. Explains cavitation and turbulence, effects of corrosion and erosion. 16mm, color, 25 min. For loan, write:

Fisher Governor Co., Marshalltown, Iowa.

Blasting Vibrations—Cause and Effect depicts what goes on in the earth when a blast of explosives is set off, and what it does to nearby structures. In one sequence a portable seismograph shows that dynamite produces less vibration than a slammed door or high-heels walking across a floor. 16mm, color, sound, 26½ min. Write to:

Advertising Dept., Hercules Powder Co., Wilmington 99, Del.

Insulating with Plastic traces the development of flexible foamed plastic insulation and describes its properties. Shows application techniques in actual installations and presents 45 case histories of jobs in various fields. 35mm, sound, color, 18 min. Write to:

Armstrong Cork Co., Lancaster, Pa., and field offices.

Pure and Simple depicts the problems of industrial waste and water conservation. Shows how the problems are solved at one installation of a sewage treatment plant. 16mm, sound, color. For loan, write:

Link-Belt Co., Public Relations Dept., Prudential Plaza, Chicago 1.

For STRENGTH...get NIBROC® Hi-Dry Towels
Extra strength to stop tearing or shredding in wet hands
Exclusive Hi-Dry fibres to soak up water faster
Reduced waste
The result:
Real savings in your annual towel costs
Next time get Nibroc Hi-Dry Towels.
Another Quality Product of BROWN COMPANY
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GOOD IDEA! SEND TODAY for samples, complete information and name of nearest Nibroc dealer. Check also for a Customer Service set of 8 Washroom Posters that will help you cut towel consumption—reduce maintenance.

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Towel Sales Division, Dept. NC-7, 150 Causeway St., Boston 14, Mass.

☐ Send samples and complete information ☐ Send me set of Posters

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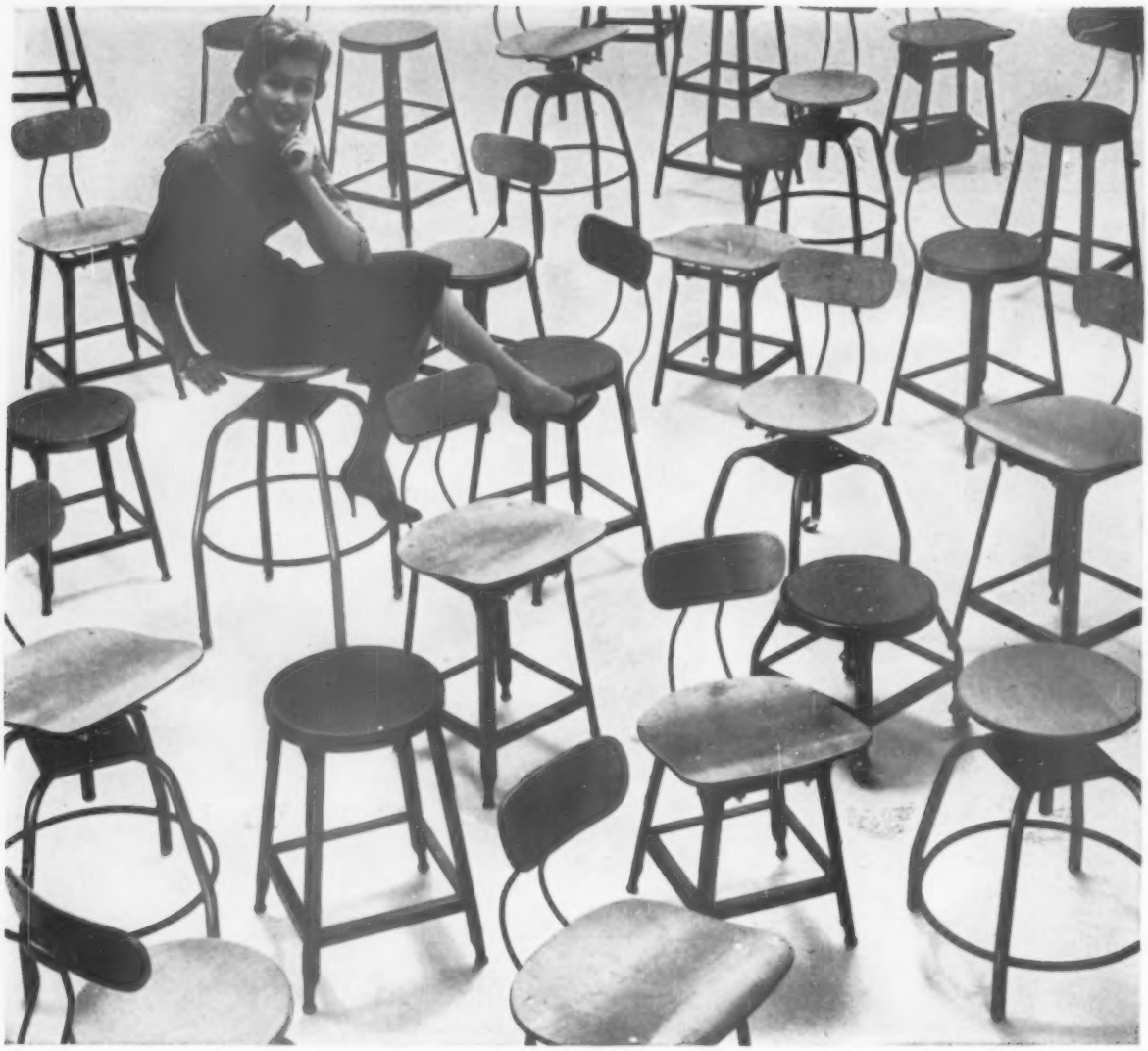

Expect help from Hallowell in any sit-uation

Hallowell—one of your top-ranking sources for work benches, shop desks, tool stands and shelving—also makes chairs and stools for just about every job in your plant.

Talk about choice! There are chairs and stools with fixed or adjustable-height steel legs; tubular or channel legs; legs tipped with rubber or rubber with steel glides. Make a sit-down test. There are seats of steel, steel topped with Presdwood, seats round or contoured, fixed or adjustable in height; revolving or stationary. Lean comfortably against steel or plywood backrests, clamped or hinged.

Select from posture or regular models. All Hallowell chairs and stools are of sturdy construction with baked-on enamel finish.

And as a last comfortable touch, there are Hallowell covered foam rubber cushions for seats and backrests.

Write for complete information to Columbia-Hallowell Division, SPS, Jenkintown 11, Pa., or SPS Western, Santa Ana, Calif.

SPS

Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • The National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada, Ltd. • Unbrako Socket Screw Co., Ltd.

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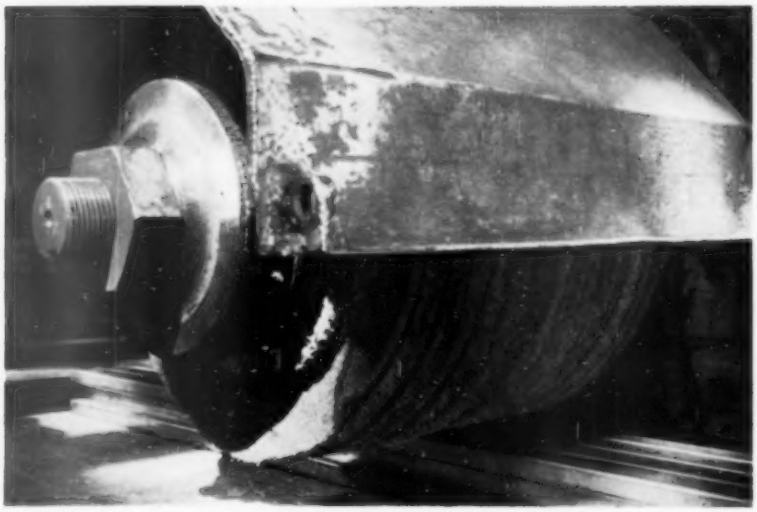
FACTORY MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.



HERE SCOTCH-BRITE DOES FAST FINISH ON WINDOW-FRAME PARTS.

It Scrubs, Finishes, Polishes

Now there's something new for finishing your fabricated metals. The material, Scotch-Brite, is a nylon web impregnated with fine grades of abrasive mineral. It has been developed for use on stainless steel, aluminum, zinc, brass, copper, titanium, other non-ferrous metals.

The finish is said to be unique. Can be used for stripping, scrubbing, polishing. (Polishing time can be reduced—one pass under the material and dissimilar mill finishes have a consistent piece-to-piece appearance.) Scotch-Brite can be used for automatic, semi-automatic, hand-held, and hand operations. Some of the items on which the material is being used for finishing are aluminum extrusions, die castings, tubing, forgings, stampings and sheets; builders hardware; copper sheets; elevator and escalator trim, restaurant fixtures.

Material comes in disk form about ¼-in. thick and can be ganged on common spindle to any width. Sizes: 6-, 8-, 10-, 12-, and 14-in. disks, in four types—very fine, fine, medium, and coarse; also in sheets and rolls. *Minnesota Mining & Mfg. Co.* (Circle 251).

This Motor Is Taking a Bath

One way to keep motors clean is to give them baths. This motor bath is a non-toxic, non-flammable, non-explosive, neutral liquid. When submerged in the liquid electric motors can clean themselves of oil, grease, and other contaminants while operating under their own power. The bath can be used over and over again, and filtered for greater economy. *Ranco Industrial Products Corp.* (Circle 252).

253—Heat Shield, designed to protect workers from flying slag and other hazards, has window of tempered Pyrex glass coated with thin, transparent metallic film. Heat bounces off coating, which is permanently bonded to the glass. Has many other uses. *Corning Glass Works.*

254—Foam Tape, made of polyurethane coated on one side with pressure-sensitive adhesive, is said to hold in place permanently. Tape and adhesive are non-corroding, moisture-proof. Foam maintains shock-absorbing qualities. Easy to use. *Richard, Parents and Murray.*

255—Spray Mix is a new refractory gunning material for use with all types of wet mix or nozzle mix equipment with low rebound. Mix is abrasion- and acid-resistant; its service temperature range is from 200 to 2500 F. Packaging is dry in 50-lb. bags. *Plibrico Co.*

New Safety Floor

Here's a flooring that's a new safety plate product. Called Checker Plate ("CP") it consists of raised pattern steel floor plates stitch-welded to roll-formed fluted panels. Floor plates come in 16-, 14-, 13-, and 12-gage steel with medium pattern, square and diamond-shaped; fluted element is 18-, 16-, 14-gage galvanized steel. Applications? Platforms, walkways, and mill floors; manufacturing and fabricating plants. In lengths up to 20 ft. in standard 18-in. width. *American Steel Band Co.* (Circle 256).

Turn the page

For more about these items, circle numbers on Reader Service Card next to back cover.

257—Fiber Glass Reinforced Film is lightweight and easy to handle, will not bag or stretch, resists rips, tears. This barrier film has many uses in construction, other industries. In 2x2- and 4x4-in. meshes, 100- and 150-ft. rolls, natural or black. *Gering Products, Inc.*

258—Two Roof Coatings that divert up to 71% of sun's heat and reduce under-roof temperatures, are said to give protection for many years. Coatings of pure aluminum flakes added to specially prepared asphalt base form metallic shield when applied to roof. *Toch Bros.*

259—Superglazed Panels are weather-resistant, have color stability and flexural strength. Superglaze provides bond between resin and glass fiber bundles to make fibrous glass panels that are durable and retain their beauty for a long time. *Alsynite Co. of America.*

260—Aluminum Alloy has high impact strength and can take bending and deformation. Any mold medium may be used with Adaptaloy, but it is not recommended for die-casting. Can be anodized to give white surface, then dyed any color. *American Smelting & Refining Co.*

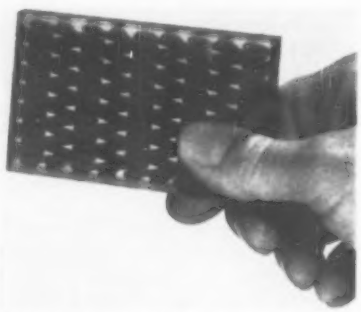
261—Pavement Sealer is said to lengthen life of asphalt and black top surfaces. Applications: resurfacing and protecting driveways, gasoline station aprons, fuel ramps, parking lots, similar areas. Revo is easy to apply with brush or squeegee. *Revere Chemical Corp.*

262—Fluorescent Inks for stamping non-porous surfaces are useful for in-plant coding, marking of parts. Inks are invisible and transparent in ordinary light but fluorescent under long-wave ultra-violet or black light. Good adhesion, durable. *Ultra-Violet Products, Inc.*

263—Scratch-Resistant Coating, Zincilate WST-100, gives temporary protection to polished surfaces, such as metals, glass, etc. It's easily removed with warm rinse. Non-flammable; air dries to full hardness in 30 min. Needs no mixing. *Industrial Metal Protectives, Inc.*

264—Wood Adhesive is for use with all types of wood; especially good for bonding maple and birch. Permabond 665 is a fast-setting white glue; has good gap-filling properties, excellent strength. And it's resistant to heat and solvents. *Continental Chemical Corp.*

265—Fire Retardant Coating (Compound "DS") protects surface to which it's applied, keeps fire from spreading. For use on timber, hardboard, acoustic, insulation, and woodchip board, plywood. Applied by brush, roller, or spray gun. Can be painted. *American Vamag Co.*



266—Gripper Sling Covering of clear plastic has been developed to prevent damage to surface of a load during handling. Also protects against corrosion. It's applied by a molding process that produces smooth rectangular covering around sling. *Cambridge Wire Cloth Co.*

MATERIALS LITERATURE

267—Waterproofing and Roofing systems are based on woven glass cloth. Bulletin (16 pages) describes advantages. Lists other component parts of systems, comparison and selection tables, specs, application photos. *Twinsburg-Miller Corp.*

268—Sandwich Walls of aluminum, field-assembled with end-welded studs, are discussed in 4-color, 16-page booklet. Chart shows specific types of wall for various conditions. Application drawings. *Gregory Industries, Inc.*

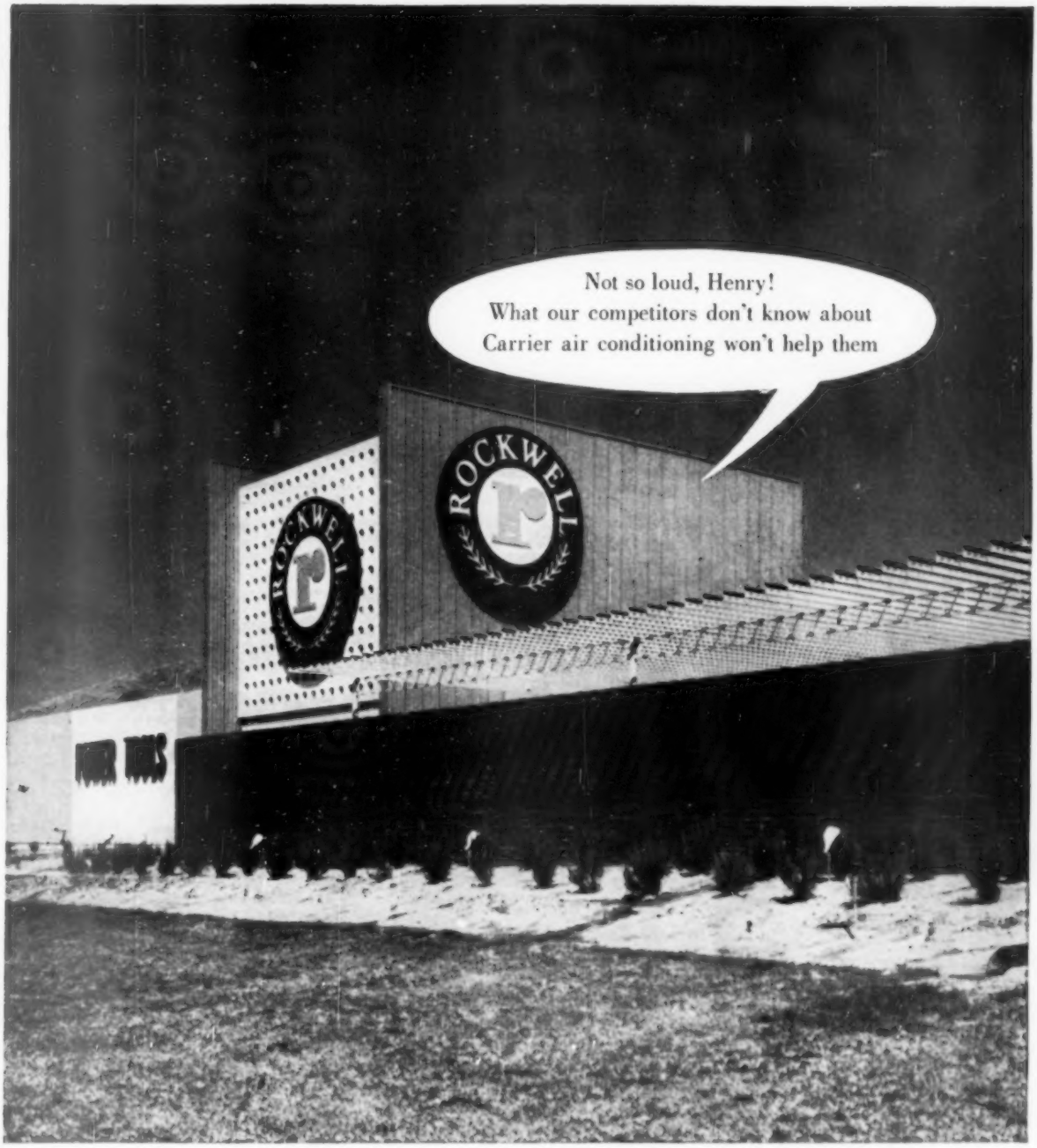
269—Ventilating and Exhaust systems, plus the problem of duct corrosion, are set forth in 4-pager. Rectangular and round ducts, standard and custom fittings, and components, are of structural grade plastic. *American Agile Corp.*

270—Concrete Plank, prefabricated and prestressed, for roofs and floors, is described in 8-page catalog. Spanblok is fabricated in depths of 4, 6, and 8 in., with modular width of 16 in., spans up to 32 ft. *Prestressing Inc.*

271—"Dylene" Polystyrenes are defined in 24-page technical bulletin (C-9-231). Booklet has two sections—one on normal, the other on modified polystyrenes. Gives new applications, fabrication, and other info. *Koppers Co., Inc.*

272—Flame Ceramic Process for protecting metals against temperatures up to 5500 F. is covered in illustrated 6-pager. Includes descriptions of process, flame ceramic torch, powder feeder, and powders. *Continental Coatings Corp.*

273—Stainless Strip Steels that can be hardened and tempered are discussed in 16-pager. Lists applications of this heat-treated strip steel, shows photos of some of the products. Other info. *Uddeholm Co. of America, Inc.*



The conversation above is purely fictitious, of course. But it might have occurred in an organization less generous in sharing its experience than the Rockwell Manufacturing Company, well-known producer of meters, valves and power tools. The reason? Carrier air conditioning in the five Rockwell plants, first put in operation in 1954, has brought about an 18 per cent increase in employee productivity – 18 per cent, that is. To say nothing of better workmanship, more usable floor space and lower costs. In addition, Rockwell gains the operating economy of Carrier Automatic Absorption Refrigerating Machines which produce chilled water for air conditioning from the same boilers used for winter heating. Start such benefits coming your way by calling the Carrier office near you. Or write Carrier Corporation, Carrier Parkway, Syracuse 1, New York.

BETTER AIR CONDITIONING FOR EVERYBODY EVERYWHERE

Carrier

THIS IS THE WAY

(THE MAGLINER WAY)

You name the loading job—there's a Magliner to solve it the cost saving way! Magliner Dock Boards for truck or rail . . . Dock Extensions . . . Mobile Loading Ramps . . . Delivery Truck Ramps. Magliners do a big job for many companies, and can do the same for you . . . moving your loads between dock and carrier for less money than it's costing you now! *Get all the facts!*

WRITE FOR BULLETIN DB-204
MAGLINE INC.
P. O. Box 47
Pinconning, Michigan

MagLiner MAGNESIUM
DOCK BOARDS
LOADING RAMPS

236 Circle 597 on Reader Service Card

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

ELECTRICAL

346—Gear Motors. Bulletin 191 gives complete data on this line of gear motors. Sterling Electric Motors.

347—Control Centers. Bulletin 798 has full details and mechanical features. Allen-Bradley Co.

348—Adjustable Speed Drives. Adjustable-Speed Bulletin gives complete info, describes features. Square D Co.

349—Rectifiers. Here's a free guide to industrial rectifier equipment for the asking. Sel-Rex Corp.

350—Fuses. Bulletins HCS and FIS on high-capacity and dual-element fuses. Bussmann Mfg., McGraw-Edison Co.

351—Silicones. Copy of new booklet details advantages of silicone insulated equipment. Dow Corning Corp.

352—Motor Rewinding. Booklet-7622 gives full information on epoxy encapsulation. Westinghouse Electric Corp.

353—Graphic Instruments. Information on portable or panel-mounted model strip chart recorder. Rust Industrial Co.

MECHANICAL

354—V-Belts, Sheaves. 100-page Multi-V-Drive Manual for selection of right sheave and V-belt. Worthington Corp.

355—Chains, Sprockets. Book 2657 has 154 pages of complete data on full line of chains and sprockets. Link-Belt Co.

356—Speed Reducers. Catalog 55 gives detailed specifications, wide size and capacity range. Horsburgh & Scott Co.

MAINTENANCE

357—Lubricants. Booklet, "Management Practices That Control Costs via Organized Lubrication." The Texas Co.

358—Vacuum Cleaners. Descriptive catalog (155B) lists line of dual-purpose vacuum cleaners. Spencer Turbine Co.

359—Rust Preventives. Literature on rust preventives includes applications and color charts. Rust-Oleum Corp.

360—Drain Cleaners. Helpful literature gives full data on equipment for handling stoppages. Kollmann Mfg. Co.

361—Lubrication Equipment. Catalog shows line of industrial lubrication equipment. Alemite Div., S-W Corp.

362—Hydraulic Rams. Catalog No. 25 lists hydraulic rams and features. Capacities: 4 to 60 tons. Hein-Werner Corp.

363—Hydraulic Pipe Benders. Catalog No. 35 on benders for pipe, conduit, and tubing (⅜ to 8 in.). Hein-Werner Corp.

364—Power Sweepers. New brochure describes useful addition to line of floor machines. Clarke Floor Machine Co.

365—Paint. Color chip catalog shows complete line of heavy-duty maintenance paints. Barreled Sunlight Paint Co.

366—Sanitary Chemicals. New technical brochure, "Engineered Maintenance" on sanitation. Puritan Chemical Co.

367—Floor Scrubbing Machine. Literature describes combination dry or wet-scrubbing machine. Finnell System, Inc.

368—Machine Mounts. Consolidated Facts Bulletin gives details and features on this line. Unisorb Div., Felters Co.

369—Concrete Waterproofing. New 20-page specification guide WS-17 is just off the press. Standard Dry Wall Products.

PRODUCTION

370—Heat Exchangers. "WU" catalog GC-1054 and "SU" catalogs SC-159 and SI-159 are available. Bell and Gossett Co.

371—Fastening Tools. Catalogs 30-A, 30-B, 30-C, and 30-D on several types of these tools. Apex Machine & Tool Co.

372—Stainless Steel. Booklet, "AM-350 and AM-355," gives full data on this product. Allegheny-Ludlum Steel Corp.

373—Flexible Metal Hose. Here's complete information and specifications for varied applications. Titeflex, Inc.

374—Insulation. Full information on foaming resin for poured insulating applications. Thiokol Chemical Corp.

375—Finishing Systems. Catalog A-658 gives complete details, describes representative installations. R. C. Mahon Co.

376—Mask Washing Machines. Literature tells about features for saving time and money. Conforming Matrix Corp.

377—Paint Spraying Masks. Descriptive literature has info on line of varied types. Conforming Matrix Corp.

378—Spray Painting, Finishing. Free literature fully describes features of this equipment. Conforming Matrix Corp.

Turn the page

The speedy and efficient manner in which the fire in our plant was detected and extinguished left nothing to be desired.

W. D. Ford

Purchasing Agent

ARTISAN METAL WORKS COMPANY

Cleveland, Ohio

.... protects its property

Automatically — gets better

FIRE and **BURGLARY** protection

saves $2,500 a year

Mr. Ford's statement reproduced above refers to a fire which started on a workbench at 5:46 p.m. on January 22. Instantly detected and reported to the fire department by ADT Aero Automatic Fire Alarm Service, the blaze was promptly extinguished by Cleveland fire fighters.

One of the country's leading sheet-metal fabricators, Artisan Metal Works Company must maintain steady production to supply its customers with specially built cabinets for electronic and mechanical equipment. And to guard against interruption by fire and other hazardous conditions, the company's 60,000 square feet of factory space is protected *automatically* by ADT.

Aero Automatic Fire Alarm Service stands constant guard to warn of fire and summon fire-fighting forces. ADT Burglar Alarm Service detects unauthorized entry and automatically summons police. ADT Heating Supervisory Service automatically detects and reports dangerous variations in temperature. In all cases, ADT provides regular inspections, tests and complete maintenance of its equipment.

Company officials report that this superior protection saves $2,500 a year over the cost of hourly patrols.

May we show you what ADT can do for you?

An ADT specialist will show you how the right combination of *automatic* services can save you money and give better protection for property, profits and employees' jobs. Call our local sales office if we are listed in your phone book, or write to our Executive Office.

ADT

Controlled Companies of

AMERICAN DISTRICT TELEGRAPH COMPANY

Executive Office: 155 Sixth Avenue • New York 13, N. Y.

A NATIONWIDE ORGANIZATION

For more facts Circle 598 on Reader Service Card

here is the world's smallest and simplest strip chart recorder!

the new rustrak recorder $69.50* FOR 1 MA DC

- AMPLE STORAGE: Contains 63-ft. chart roll, or 31 days' recording at one inch per hour. Useful chart width 2 5/16".
- ACCURATE: Galvanometer pointer swings free for maximum accuracy, being clamped briefly for marking.
- INKLESS: Recording process is completely dry, utilizing special pressure sensitive paper. Method provides remarkable definition.
- RECTILINEAR: Advanced design provides true rectilinear recording free from distortion.
- RELIABLE: Positive synchronous motor drive with sprocket engaging holes in paper for accurate time indication.
- VERSATILE: Portable or panel mounting models. Stocked in a variety of scales and chart speeds.

WRITE TODAY FOR LITERATURE

*Subject to change without notice.

rust industrial co., inc.
130 Silver Street, Manchester, N. H.
For more facts Circle 599 on Reader Service Card

Imagine—

ALL THIS:

- Fully automatic ignition
- 50 to 150 p.s.i. gun nozzle pressure with modulated fuel control
- 100 g.p.h. capacity
- Built-in soap tank and anti-siphon valve
- Large rubber-tired wheels

—all these and other features found only in higher-priced, bigger units

FOR ONLY $495.00 F.O.B. FACTORY

Pantex SPEEDYSTEAM "100"

It's today's biggest buy in a budget-priced quality-built STEAM-JET CLEANER

Write for Bulletin—SC-500

PANTEX MANUFACTURING CORP.
9-239 P.O. BOX 660AW PAWTUCKET, R. I.

ADVERTISERS' LITERATURE

Begins on page 236

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

379—Reproduction Materials. Here's a free copy of a booklet on Kodagraph reproduction materials. Eastman Kodak Co.

380—Schedule Board. Bulletin X-300 shows various applications of this visual control board. Graphic Systems, Inc.

381—Visual Control Panels. Catalog has info on visual control panels and equipment. Acme Visible Records, Inc.

PACKAGING, SHIPPING

382—Padded Shipping Bags. Illustrated case histories show use in leading industries. Jiffy Mfg. Co.

383—Scales. New catalog on dial scales gives specifications for both standard and special types. Howe Scale Co.

384—Paper Packaging Bags. Free booklet FM-111 describes dozens of ways to cut costs. Union Bag-Camp Paper Corp.

385—Wire Stitchers. Free booklet, "A Guide to Better Closures," is yours upon request. Acme Steel Products Div.

386—Facsimile Labels. New booklet shows you how to save time and money in shipping. Weber Marking Systems.

PLANT SERVICES

387—Paper Towel Dispensers. Free bulletins show how these dispensers can save you money. Steiner Co.

388—Dust Filters. This 36-page catalog (104) gives complete mechanical data on dust filters. W. W. Sly Mfg. Co.

389—Two-Way Radio. Case-history portfolio details successful applications. Motorola Communications & Electronics.

390—Fans. Bulletin 3720-A on belted vent; F-201 and F-104 on complete ranges and capacities. Buffalo Forge Co.

391—Bronze Gate Valves. New illustrated circular gives full information on new union bonnet types. Wm. Powell Co.

392—Steel Equipment. Catalog illustrates complete, diversified line of steel equipment. Lyon Metals Products, Inc.

393—Air Filters. Illustrated technical bulletins on space filters for specific problems. Mine Safety Appliances Co.

394—Washfountains/Showers. Catalog 5601 contains all specification data you need. Bradley Washfountain Co.

Turn the page

Charlie spends every lunch hour practicing on these new Masonite® Presdwood chutes!

When you want things to go downhill fast—to a loading dock, for instance—give a thought to these strong, smo-o-o-oth hardboard panels. Tempered Presdwood® has proved to be a good expediter in hundreds of plants. These panels cost little and last a long time. They're also a good bet for table tops, workbenches, partitions and such. Our free booklet tells all. Write Masonite Corporation, Dept. FA-7, Box 777, Chicago 90, Illinois.

MASONITE CORPORATION

®Masonite Corporation—manufacturer of quality panel products.

THRIFTY NEW THREESOME

You have unmatched lift truck performance in the 2,000-3,000-lb class with the NEW Allis-Chalmers FT20-24, FTP20-24 and FTB30-15.

You have full 35 hp — 97 ft-lb of lively torque — from the sturdy, designed-for-the-job industrial engine. This is the most power available in trucks this size.

You have balance and stability, along with the power to climb a 34% grade with pneumatic tires, 40% with cushion tires, loaded. That's *real* performance.

You have maneuverability to turn sharply, spot loads quickly. Operators like the comfort and convenience of these trucks — the way they steer and handle.

You have "years-ahead" design, with bonus strength from forks to counterweight — and unequalled timesaving serviceability.

Be sure to take another, profitable look at this Thrifty NEW Threesome of lift trucks. See your material handling dealer or write for new literature. Allis-Chalmers, Milwaukee 1, Wisconsin.

8H-111

Each New "HEFTY" FT Model Lift Truck is a real champ in its class.

ALLIS-CHALMERS

ADVERTISERS' LITERATURE

Begins on page 236

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

395—Corrosion Inhibitor. Bulletin 410-12-7 on uses of corrosion inhibiting chemical. Hagan Chemical & Controls.

396—Coupling Adaptors. Helpful bulletin F-10R lists complete line, sizes, and styles. Jordan Div., OPW Corp.

397—Compressors. Bulletin 306-12 gives full information on maker's new WN-224 compressor. Joy Mfg. Co.

BUILDINGS

398—Gratings. Free catalogs give you complete details on these new gratings. Products Div., The Globe Co.

399—Power Roof Ventilators. Bulletin 550 gives full information on sizes and capacities of this line. Clarage Fan Co.

400—Daylighting Panels. Full color literature and specification data available on request. Butler Mfg. Co.

401—Steel Grating. Bulletin 2527-R tells how to specify and order Electro-forged Steel Grating. Blaw-Knox Co.

402—Floorplate. Bulletin SD-N10 describes fabrication, installation, and maintenance features. Alan Wood Steel Co.

403—Built-Up Roofs. Copy of booklet, "J-M Aquadam Built-Up Roofs," free upon request. Johns-Manville Corp.

404—Plastic Panels. New glazing folder, Firestone and Rockwell Case Histories. Structoglas Div., Int'l Molded Plastics.

405—Aluminum Rolling Doors. Here are complete details on large aluminum rolling doors. Kinnear Mfg. Co.

406—Smokestacks. Bulletin SS-202 shows you how to get greater return from your investment. A. O. Smith Corp.

MATERIALS HANDLING

407—Dock Boards. Bulletin DB-204 gives full information on dock boards and loading ramps. Magline, Inc.

408—Batteries. Illustrated brochure 6230 gives helpful details on new Ironclad battery. Exide Industrial Div.

409—Trolley Conveyors. Book 2330 contains trolley conveyor applications and feature data. Link-Belt Co.

410—Lift Truck. Bulletin describes new heavy-duty lift truck for narrow aisles. The Raymond Corp.

Turn the page

Eye Accidents Cut 83½%, 38 Eyes Saved, $324,500 Saved

...another answer to

"Does Eye Protection Pay Off?"

Norton Company, world's largest manufacturer of abrasives, established in 1951 a complete, compulsory eye protection program covering about 2,200 employees working in eye hazardous areas.

What are the results? Mr. Nelson P. Ingalls, Safety Engineer, estimates that on a conservative basis: (1) 38 employees today have their sight (in one or both eyes) who otherwise would have lost it (2) $43,500 has been saved in medical expense (3) $281,000 has been saved in compensation. Sufficient savings to pay for 11 years of their *entire* safety program. Medical cases have been cut 93% since 1951 and medical costs 97%.

Norton Company's experience is typical. In metalworking, the chemical industry, transportation, woodworking — wherever workers are exposed to eye hazardous operations, it pays to install an eye protection program. Yes, and *quality* protective equipment such as American Optical safety products, featuring *safety standard frames and lenses* fitted to the job and the worker, is basic.

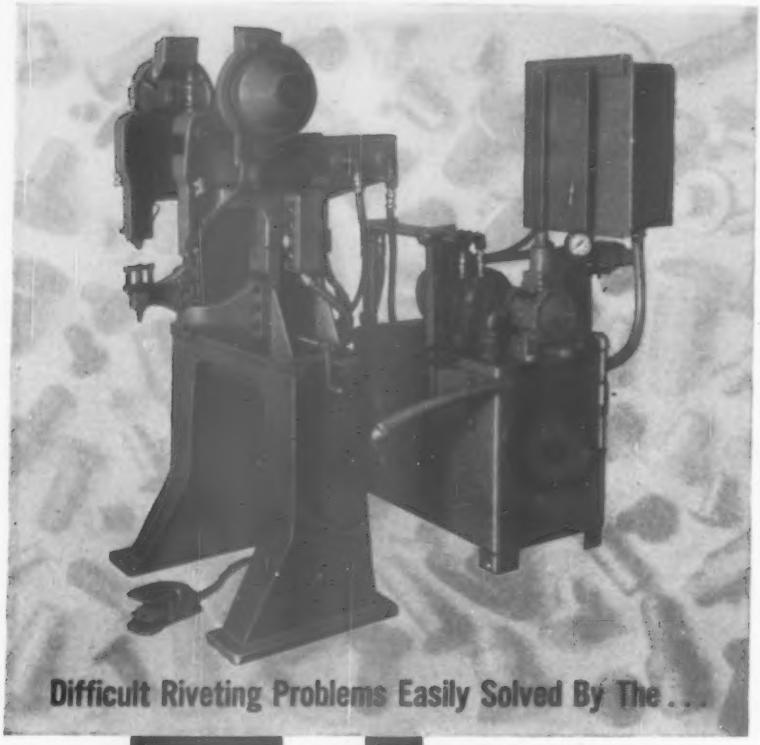
NOTE: The laws of Massachusetts specify that for the total loss of use of both eyes, twenty dollars per week shall be paid *in addition to all other* compensation, for 500 weeks. For the loss of one eye, twenty dollars per week for 200 weeks.

Always insist on the ® trademark on lenses and frames.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS
Branches in Principal Cities

For more facts Circle 603 on Reader Service Card



New T-J HYDRAULIC DUAL RIVITOR

With Increased

Riveting Production • Quality • Versatility

Added recently to the versatile T-J line of unit and production line riveting and clinching machines is the new Hydraulic Dual Rivitor. The Model HDR will set two ¼″ solid steel rivets at once with adjustable spacing from 1½″ to 18″ maximum, center to center, being fed from 10″ hoppers. Operating cycle is approximately .8 second, at 420 P.S.I. oil pressure furnished from a hydraulic power unit with maximum of 1000 P.S.I. output. For complete specifications write to The Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Michigan for Bulletin HDR-4-59.

For information on other T-J Rivitors and Clinchors write for Bulletin No. 555.

T-J TOMKINS-JOHNSON
RIVITORS . . . AIR AND HYDRAULIC CYLINDERS . . . CUTTERS . . . CLINCHORS

For more facts Circle 604 on Reader Service Card

ADVERTISERS' LITERATURE

Begins on page 236

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

411—Lift Trucks. Descriptive literature on three new models with capacities from 2000 to 3000 lb. Allis-Chalmers Co.

412—Hardboard Panels. Free booklet describes wide applications. Tells about cost-saving features. Masonite Corp.

FREE—Facts for Your Files

The articles listed below have been specially selected for your reference files from this and earlier issues of FACTORY. They are now available in File-Copy form.

As a service to readers we'll send you free one copy of each title (as long as our supply lasts). To get the titles you want, circle the File Copy (FC) number on Reader Service Card (next to back cover of this issue), then drop card in the nearest mailbox. This offer is good only in the United States and Canada.

This Preventive Maintenance Program Fits Anywhere. Here's a package plan, with sample forms to fit your needs and give you controls. It's suited to almost any size and kind of plant. **FC-23**

Yes, You Can Get the Boss's Ear. Takes a lot of know-how to give the boss what he needs—and win what you need: his attention. You'll welcome these tips from an old boss-handler. **FC-32**

Making Better Decisions on Mechanization. When a project goes sour—doesn't pay off—chances are somebody flubbed on figures. Here's help in getting the dollar facts. **FC-36**

16 Ways to Spot Power Trouble Ahead. If you think your plant is coasting along just fine on its present electrical system, you could be dangerously wrong. Here are 16 ways to spot trouble coming. **FC-37**

If you want more copies of these File Copy articles, write direct to Reader Service, FACTORY, 330 West 42nd St., New York 36. Prices for quantity orders are as follows (100 or more, F.O.B. New York):

No. of copies	Price per copy
1-99	35¢
100-299	25¢
300-499	20¢
500 or more	15¢

When Accessibility
is a factor...

Specify Blaw-Knox Electroforged® Steel Grating and Treads

Around pickling, galvanizing, and quenching installations, Blaw-Knox Electroforged Steel Grating is preferred because it offers ready access to valves and piping both above and below walkways. Electroforged into one-piece sections, Blaw-Knox grating cuts to install easily, and can be removed easily for maintenance work.

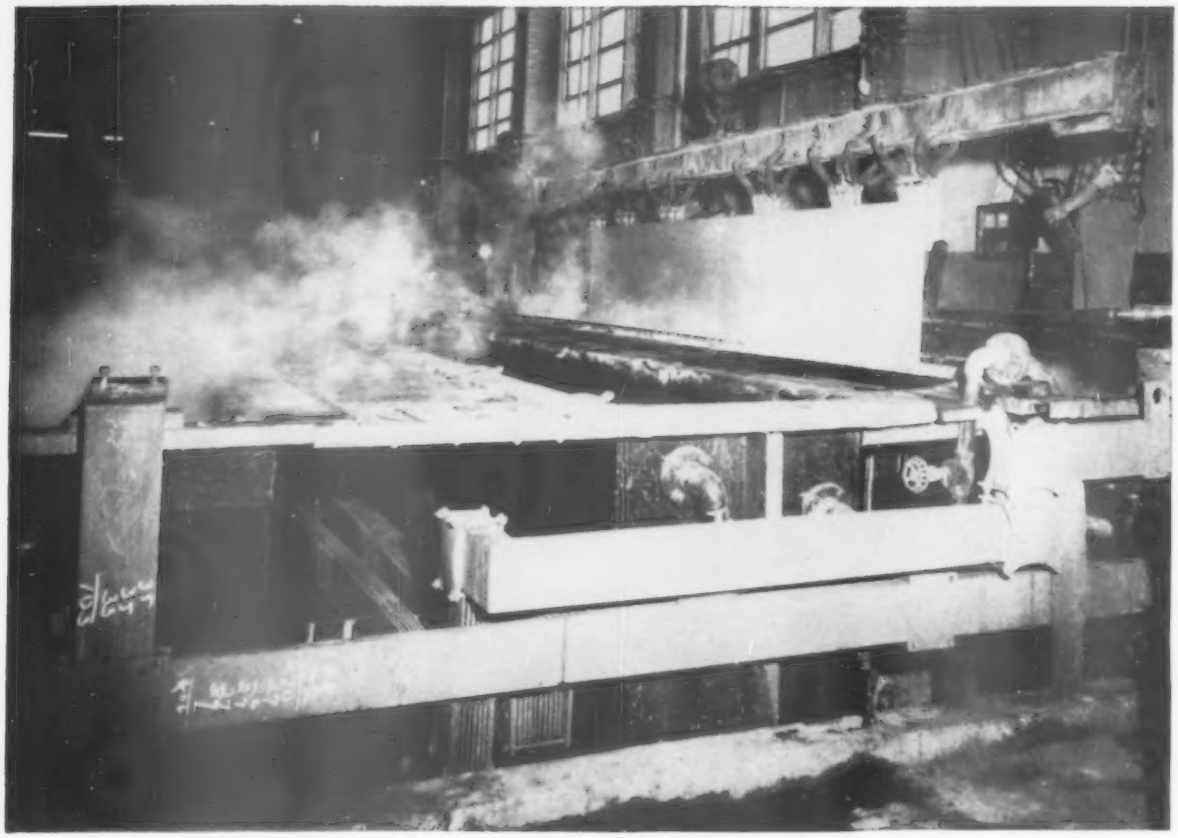
For safe walking, Electroforged grating features a non-slip, twisted crossbar and a choice of either square or serrated bearing bars. Joints and crevices, where dirt and grease usually collect, are eliminated. Cleaning is just a matter of washing down.

For information on how to specify and order the Blaw-Knox Electroforged Steel Grating best suited to your needs, write for a copy of Blaw-Knox Bulletin 2527-R.

BLAW-KNOX

BLAW-KNOX COMPANY
Blaw-Knox Equipment Division
Dept. B, Pittsburgh 38, Pennsylvania

For more facts Circle 605 on Reader Service Card



— Mr. L. P. Vollmuth, V. P. of Bart Mfg. Co., Belleville, N. J. talks acid tank protection:

"Bitumastic coatings have given us 2½ times the service life of more expensive materials"

Bart Manufacturing Co., producers of "Lectro-Clad" plate, pipe fittings and other electroplating processes, has a really tough corrosion problem on plating and pickling tanks. Protective coatings must withstand the fumes and occasional spillage of hot sulfuric acid and alkaline cleaning solutions. An expensive, complex coating system applied to the submerged tanks failed in just one year.

The tanks were removed from their pits, cleaned and given two coats of Bitumastic No. 50, the heaviest of the coal-tar based Bitumastic coatings. That was back in 1956 and on recent inspection, the Bitumastic coating system is still sound with no sign of deterioration. Bart makes extensive use of Bitumastic coatings in its other plants, too, where protection of chemical equipment is required.

Our files are filled with case histories like this, where firms have found coal-tar based Bitumastic coatings the answer to tough corrosion problems. We'd like to send you more information for your evaluation of these materials; it is likely they can help in *your* corrosion-prevention program as well. Use the coupon below, or write Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa.

District Offices: Chicago, New York, Boston, Los Angeles, Pittsburgh and Woodward (Birmingham) Alabama.

Koppers Company, Inc.
Tar Products Division
Dept. 135G, Pittsburgh 19, Pa.

Gentlemen:
Please send me additional information on Bitumastic Protective Coatings for industrial corrosion prevention.

Name_____ Title_____
Firm_____
Address_____
City_____ Zone____ State_____

KOPPERS

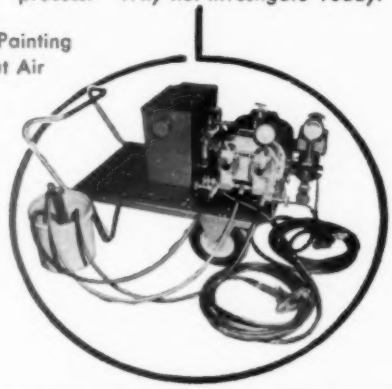
BITUMASTIC
REG. U. S. PAT. OFF.
COATINGS AND ENAMELS

For more facts Circle 606 on Reader Service Card

airless* spray coating

Airless Spray Painting by Nordson reduces most of the waste and inefficiency prevalent in conventional methods by eliminating air as an atomizing agent. Paint savings of 50% and labor savings as high as 80% have been effected by utilizing this modern spray coating process. *Why not investigate Today.*

*Spray Painting Without Air



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In Canada: 864 Pape Ave., Toronto, Ontario

THE BEST IN SPRAY COATING EQUIPMENT

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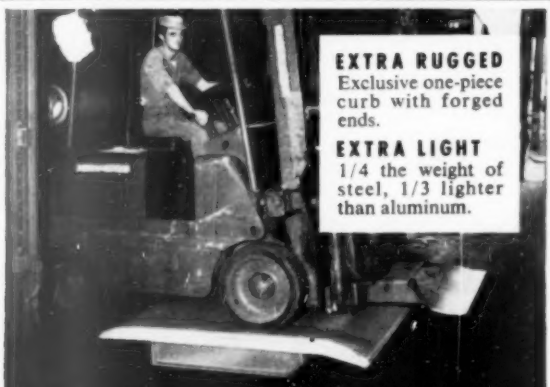

Reduce Loading Costs WITH NEW B&P Magnesium Dockboards

Lighter, stronger B&P Magnesium dockboards get the job done faster, easier and at less cost. All dockboards are heat treated for stress-relief after welding. B&P offers these advantages—one-piece stringer with forged ends, full-length hand grips, yellow curb markings, crowned contour, beveled edges, safety tread, wide range of sizes for every loading need.

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Once the plans are approved, you get fast delivery on TUBAR Dumpers because we have a modern integrated assembly plant with complete stocks of components at hand.

TUBAR Dumpers are designed to handle a wide range of materials, including chemicals, food products, pigments, liquids, castings, stampings . . . everything that is emptied from drums, cartons, crates, or bins.

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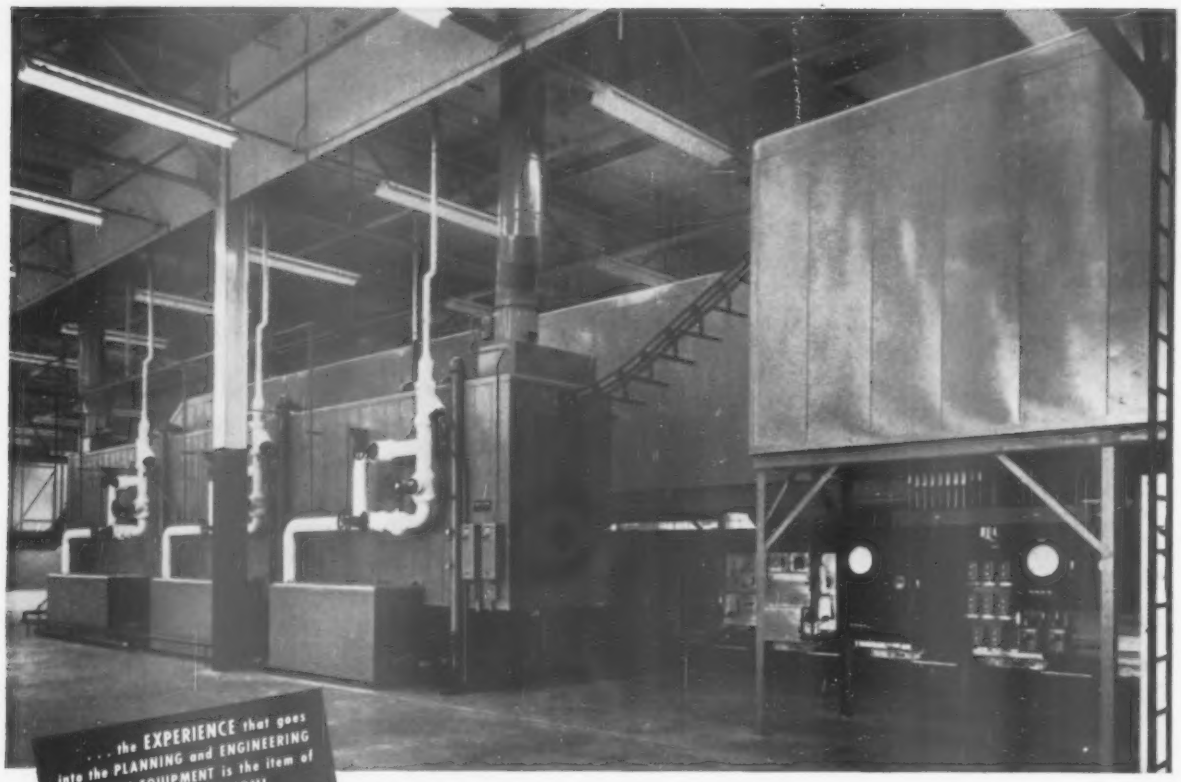

METAL OFFICE FURNITURE, Like Any Other Type of Metal Product You Could Name, is FINISHED in MAHON EQUIPMENT!

The modern finishing system pictured above was recently installed by Mahon in a plant of one of the major manufacturers of Metal Office Furniture.

When you have a finishing problem, or need new finishing equipment, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering which is so vital to a properly coordinated production painting system.

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Engineers and Manufacturers of Complete Conveyorized Finishing Systems; Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Cooling Tunnels, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Paint Stripping Equipment; Core Ovens, Soldering Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium; Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-658

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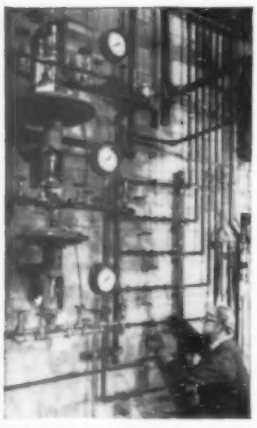
SPANG Distributor: W. T. Andrew Company, Detroit, Michigan
Mechanical Contractor: Harrigan & Reid Company, Detroit, Michigan

SPANG Pipe gives Rinshed-Mason, paint manufacturers, the top-quality performance they need for their solvent lines.

"In 40 years of buying SPANG, we've never received one foot of defective pipe"

says Mr. William J. Whelan, Purchasing Agent for Harrigan & Reid Company, Detroit, Michigan



SPANG Pipe plays an especially important role at the inert gas reducing station. Any pipe failure in this system could be costly in terms of paint spoilage; finest materials must be used to insure reliable performance.

"*Reliability* is the one word that best characterizes SPANG Steel Pipe" reports Mr. Whelan. "Actually, there are three good reasons why we buy SPANG Pipe: one, SPANG prices are competitive in every respect; two, delivery adheres to promised commitments; three, SPANG quality is consistently high.

"In this piping installation at Rinshed-Mason Company, a major paint supplier for the automotive industry, *top-quality* pipe was especially important. Besides the plumbing and heating systems, we used SPANG Pipe extensively in the paint-processing system. This process piping carries raw materials and intermediate products from storage tanks to weighing tanks, then to production equipment.

"Altogether, approximately 40 different kinds of liquids are carried by this process piping, including vegetable oils, phthalic anhydride, and a variety of 16 solvents."

SPANG CAN MEET YOUR REQUIREMENTS, TOO. Whether you're installing plumbing and heating systems or more demanding systems of process piping, *quality-controlled* SPANG Steel Pipe is your best bet for reliable installations. Call your local SPANG Distributor for the *top-quality* steel pipe . . . SPANG Steel Pipe.

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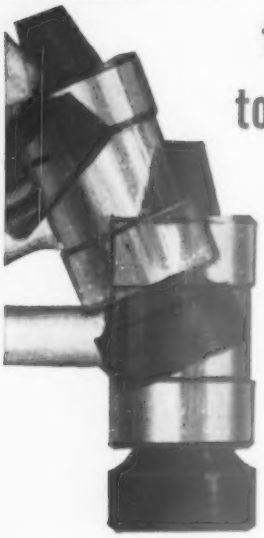

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In addition to hammer-in Shure-Set, the versatile Ramset Fastening System includes Ramset powder-actuated method for heavier fastening, and Ringblaster® heavy-duty kiln gun.

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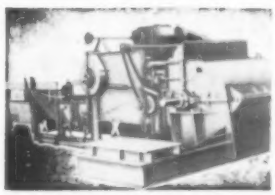

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50 YEARS AGO, EXIDE PATENTED THE TUBULAR PLATE BATTERY

Exide was already 21 years old when it launched the Exide-Ironclad Battery—back in 1909. But the idea of the tubular positive plate was brand new. It was especially designed for electric truck service. Would it really give the longer battery life Exide engineers expected? Would it make possible greater battery economy? Look at the results.

Against every other type of battery—in every type of industrial truck application—in all kinds of heavy duty service, nothing has been found to match the Exide-Ironclad. A recent survey revealed that 91% of truck owners who have used Exide Batteries still use them. Once they experience the advantages Exide Batteries offer, they seldom buy any other brand. No other battery approaches this record of user satisfaction.

Today, of course, the Exide-Ironclad Battery is 50 years better than it was in the beginning. Exide engineers have constantly improved it. They have learned the secrets about tubular plate construction that only experience could teach—secrets about casting the lead grids, formulating grid alloys, composition of active material, filling the tubes, performance of tubing (about 20 different types were tested over a 15-year period before the last change). So the new Exide-Ironclad Batteries give today's buyer greater life and economy than ever before.

For more details on the new Exide-Ironclad Batteries, write for a copy of the 8-page, illustrated Brochure #6230

Today's advanced-design electric industrial trucks yield their greatest economy and productivity when teamed with the new, more powerful, Exide-Ironclad Batteries.

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An ever-alert "watchman", Realock Fence prevents wanton damage to plants and factories...stops burglary of material and equipment stored outdoors . . . is a safe, sure way to isolate "off limits" areas.

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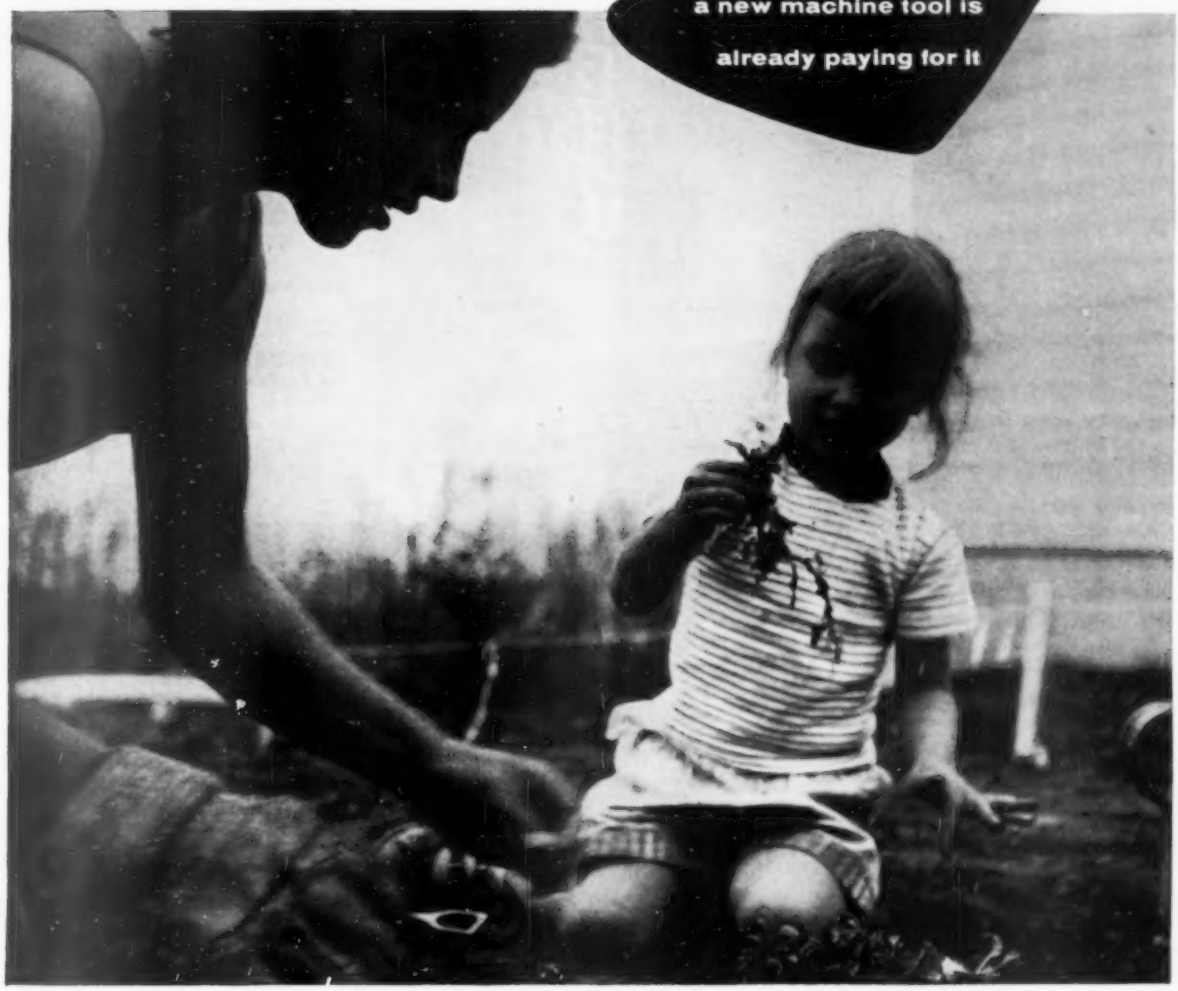

Spring planting . . . 1949

Just ten short years ago, but a lot of changes have taken place.

Except for Mother, who is every bit as attractive, nothing has remained the same. The garden is now long-established and flourishing, and Daughter is entering college in the fall.

In Dad's shop, things are quite different, too. Labor rates, prices of raw materials and overhead have kept climbing constantly.

Those once-new machines are still running O.K., and seem to have plenty of usefulness left in them. The big hitch, though, is that their performance standards were based on the costs of *ten years ago*. With today's increased costs, the *profitability* of these machines is in serious doubt.

The cost analyses Dad is now completing show very clearly that successful production under *today's* conditions requires *modern* equipment. He used J & L's new "Avoidable Costs" Replacement Formula. It's simple, clear cut and realistic, and avoids the fallacies found in other replacement formulas.

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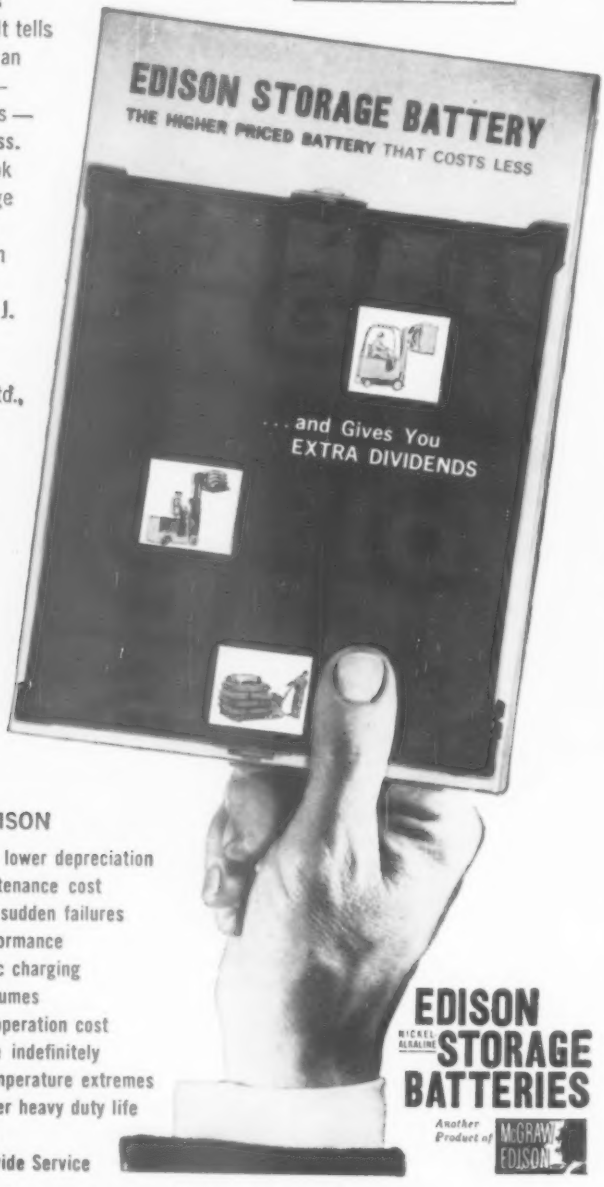

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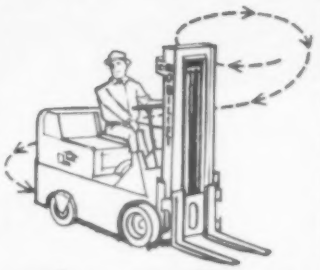

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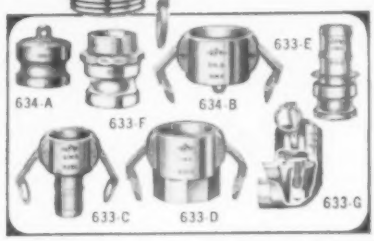

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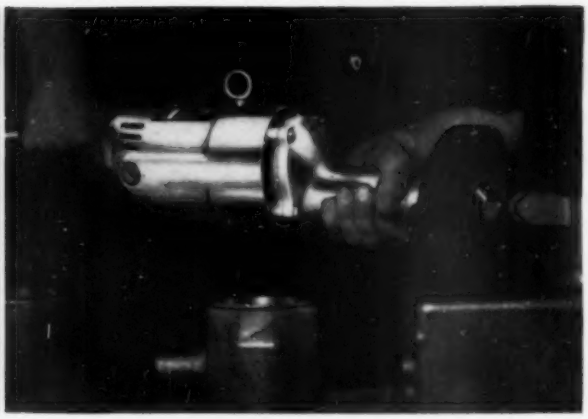

6" HEAVY DUTY PORTABLE GRINDER tackles the toughest work encountered in grinding heavy castings, wire brushing or buffing and polishing most metal surfaces. Contour-grip handle.

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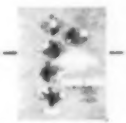

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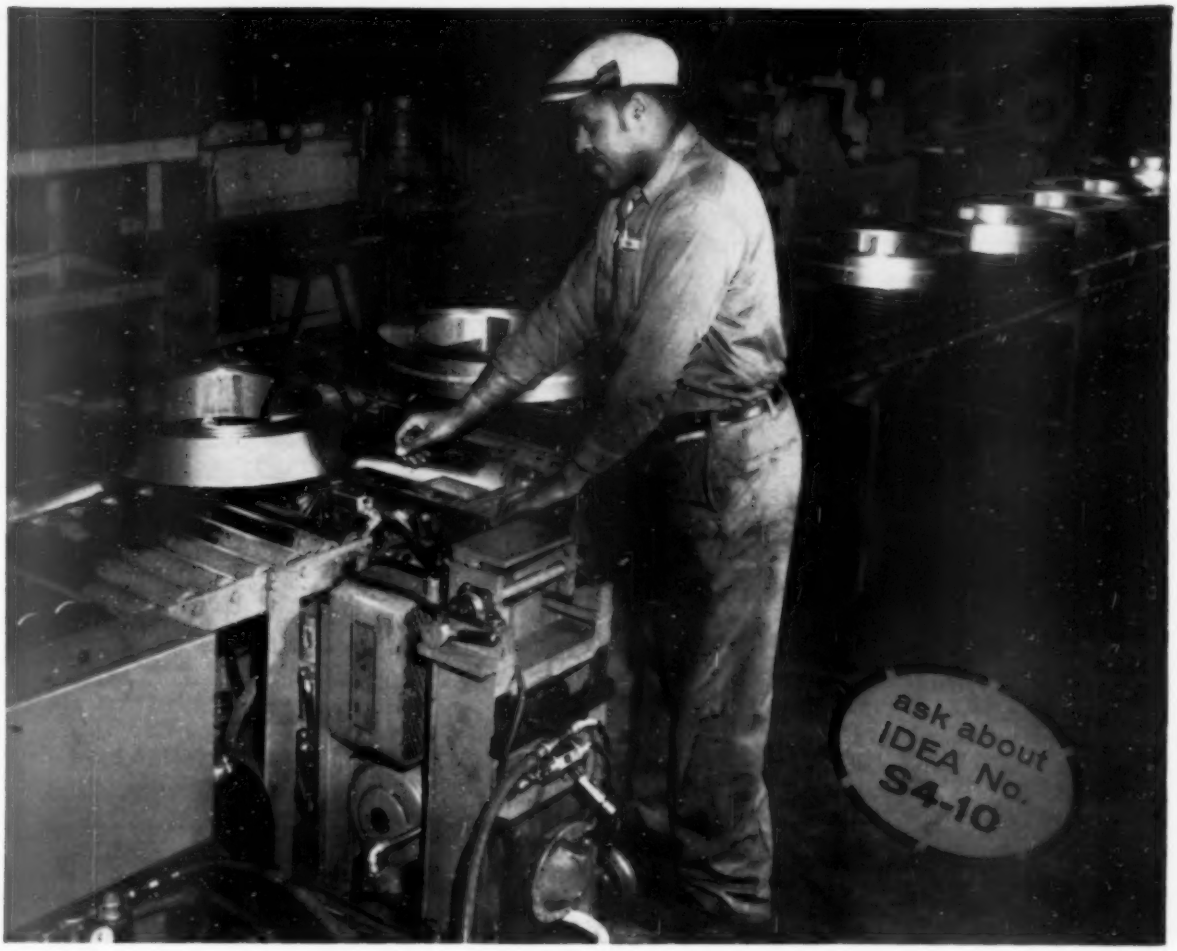

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FACTORY PUBLISHER'S LETTER

Honors for Award-Winners

In our May issue, FACTORY's editors announced our annual awards to the "Top Plants of 1959," the ten best plants completed during the past year. They told you these plants were selected out of some 700 nominations, and they described their outstanding winning qualities.

But what the editors couldn't tell you (because it hadn't happened then) is the story of the actual physical presentation of the awards. Now it *has* happened, and I'd like to try to share with you a little of the feeling of immense pride and satisfaction that the winners (and we on FACTORY) derived from getting together for the presentations.

We've tried to reflect some of this in the pictures on the left, tracing several stages of the process in the case of representatives of the Charles Bruning Company, whose beautiful and functional plant at Mt. Prospect, Ill., was one of the "Top Ten." The two men in the top picture are Bruning Vice Presidents S. C. Amren and Allan L. Halstead. They were among the 100 guests from all parts of the country who met with representatives of FACTORY and McGraw-Hill at the University Club in New York City on May 20. These guests included representatives of the architects, engineers, and builders of our award winners as well as executives of the winning companies.

In the second picture you can see Mr. Amren and Mr. Halstead with just such a group—the key men who sweated through the design and construction of the Bruning plant. These men are posed in front of the original watercolor painting of the plant that was presented to the company as its award.

The third picture shows the Bruning group (center, table 6) at dinner, and in the last picture you can see Mr. Amren again. He has accepted the award, and is standing by while FACTORY Editor Matt Murphy (right) congratulates Joseph A. Vedra, who represents the plant's architect-engineer, A. Epstein and Sons, Inc.

We thoroughly enjoyed these presentations, and we're sure our guests did too. But we also had the feeling that we were taking part in a serious and important event, symbolizing the great technological progress of American industry over the past quarter of a century.

Why focus on the past quarter-century? Because we were celebrating the silver anniversary of FACTORY's Top Plants awards program. To do this properly, we felt we needed a final event on our program that would sum up industry's progress and show the way to even greater progress in the future. So we invited Mr. Allan S. Austin, president of The Austin Company, to talk to us. His talk, "The Fourth Dimension in Factory Building," did all that we had hoped it would.

We particularly wanted Mr. Austin to make this talk because his company has engineered, designed, and built 25 of FACTORY's award-winning plants in the past 25 years (including one this year). With such a phenomenal record behind him, Mr. Austin seemed to us the ideal man to conclude our 25th anniversary presentation.

That's the story, readers. I've told it because you might be interested in what goes on behind the scenes. Sometimes, as in this case, we're as happy with the behind-the-scenes story as we were with what was printed in the issue itself.

Donald White

FACTORY

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16 Ways to Spot Power Trouble Ahead. If you think your plant is coasting along just fine on its present electrical system, you could be dangerously wrong. Here are 16 ways to spot trouble coming. **FC-37**

Making Better Decisions on Mechanization. When a project goes sour—doesn't pay off—chances are somebody flubbed on figures. Here's help in getting the money facts you need for better decisions. **FC-36**

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Catalogs in This Issue

To help you, here is a list of catalogs described in this issue. To obtain, circle key numbers on either postcard.

MATERIAL HANDLING
1—Electric Hoists
2—Turnover Cradle
3—Vibratory Feeders
4—Material Handling Equipment
5—Dumpers
6—Lifting Magnets
7—Pneumatic Conveyors
8—Canvas Cushion Wheels
9—Casters

MECHANICAL
10—Belt Drive
11—Gear Drives
12—Gearmotors

PLANT SITES
13—New Jersey
14—Wisconsin
15—Georgia
16—Allegheny County, Pa.
17—Florida

PRODUCTION
18—Computer Systems
19—Tube Flaring Machine
20—Vibrating Screens
21—Gaging Products
22—Univac Computer
23—Rotoblast Barrels
24—Boring Tools
25—Metal Lathes
26—Speed Lathes

AUXILIARY
27—Pumps
28—Battery Chargers
29—Lubrication, Coolant Systems
30—Rotary Pumps
31—Manifolds for Gases
32—Condensation Pumps

ELECTRICAL
33—Light Control Systems
34—Thinline Motor
35—Mercury Switches
36—Rayescent Lamps
37—Unit Substations
38—Meter-Relays
39—Electrical Connectors
40—Wiring Devices
41—Connectors
42—Motors
43—Motor Controllers

AIR HANDLING
44—Duct Fans
45—Air Purification Equipment
46—Gas-Fired Unit Heaters
47—Electronic Air Cleaner

MAINTENANCE
48—Vibration Noise Control
49—Boiler Steam/Pure Water
50—Coating Chart
51—Drafting Equipment
52—Drills, Counterbores
53—Filter Elements
54—Pushbutton Scaffold
55—Lubricant Selector Chart

VALVES AND PIPES
56—PVC Valve
57—Three-Way Valves
58—Steam Specialties
59—Hose Valves
60—Gas Flow Control
61—Integral Steam Tracing

INSTRUMENTS AND CONTROLS
62—Control Panels
63—Control Systems
64—Tape Control Positioning

EXACTLY THE PANELBOARD YOU WANT

Right Off Your Square D Distributor's Shelf!

In our contracting business, we find QMB PANELBOARDS are just the thing for heavy industrial jobs. The switches are heavy-duty horsepower rated and they plug in just like plug-in duct units or drawout air circuit breakers. The switch unit I'm holding is a twin 60 ampere 3-pole unit, rated 600 volts. We picked up the entire panelboard this morning from our local Square D distributor's stock to use on a 480 volt job. *We'll have it installed and wired by tomorrow afternoon—and no overtime.*

Notice that this 240 volt switch is much smaller than the 600 volt unit. That means we can put more circuits in the same size panelboard. Since Square D started making these new smaller units, we've been using QMB on all our commercial jobs. The interiors and boxes are the same for both 240 and 600 volt panelboards. That means one stock can work for both. *We can get the complete panelboard from our local Square D distributor the same day the job develops.*

We don't gang separate safety switches and motor starters over a trough any more. The new QMB MOTOR STARTER PANELBOARD makes a much cleaner job. It's easier to install, it costs no more, and it's in our distributor's stock. In our business, we're concerned with overall installed costs. We find the installed cost of the QMB STARTER PANELBOARD is no greater than that of separate components. The interlock between the switch and starter doors makes a much safer installation, too.

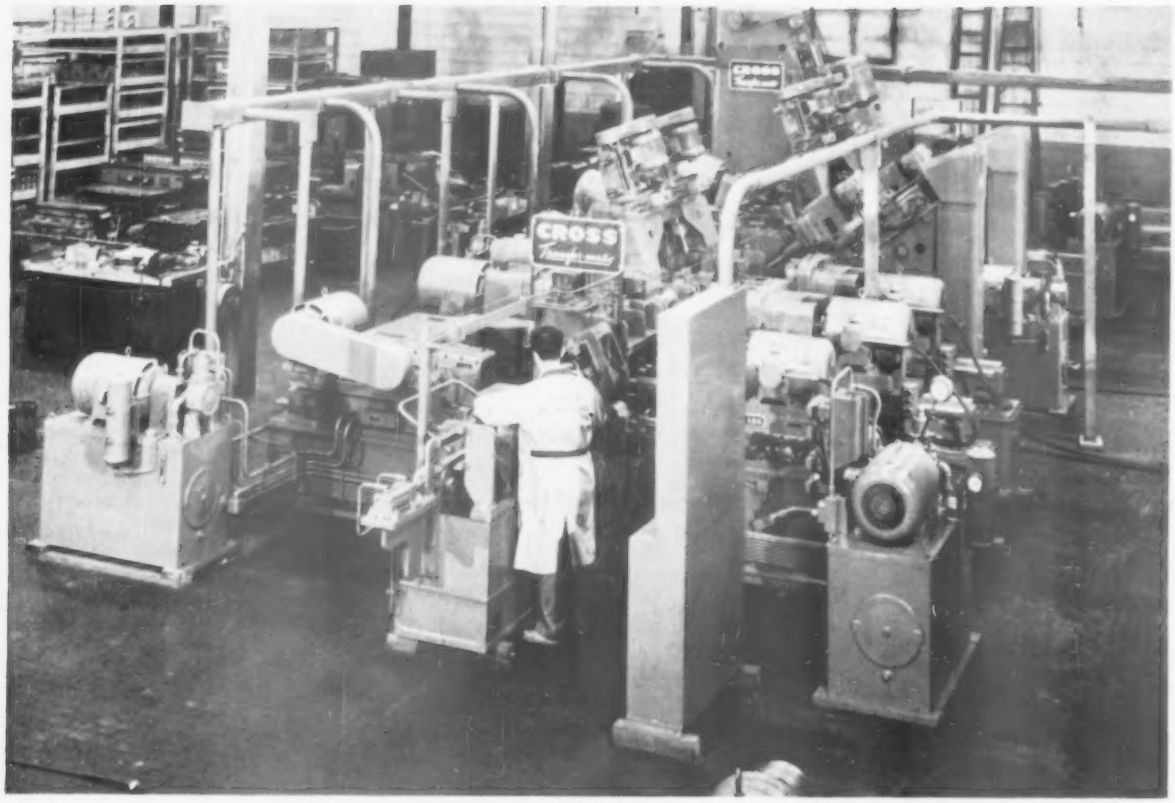
• Plug-in construction combined with heavy-duty industrial design has made the QMB PANELBOARD a tremendous success. In fact, the flexibility of this unit plus availability from distributor stocks, has made it the leading power panelboard on the market. It's available either in 600 volt or 240 volt construction. Motor control units are available for use with either voltage switch units. When switch units exceed 200 amperes, the panelboards can be obtained from the nearest Square D Assembly Plant, completely factory-assembled. It's the modern fusible standard.

For additional information
write Square D Company, 6060 Rivard Street, Detroit 11, Michigan

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

For more facts circle 447 on READER SERVICE CARD



Why Cross chose Timken® bearings for all 148 drill spindles

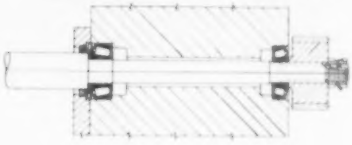
THIS huge Cross Transfermatic drills and taps holes in automobile engine blocks at new highs in speed and accuracy. To assure maximum user economy and machine life, Cross engineers chose Timken® tapered roller bearings for the machine's 148 drill spindles. Here's why:

1) *They maintain precision longer.* Timken bearings are geometrically designed to give true rolling motion, precision manufactured to live up to their design.

2) *They're extra tough* because Timken bearing steel is nickel-rich and to make sure it's the finest quality, we make it ourselves . . . America's only bearing maker that does.

When you use a machine with Timken bearings, you get all the *extra* benefits of Timken Company leadership in tapered roller bearing design and in engineering service. We maintain the industry's most modern laboratory to test bearing applications. To get better machines, make sure they're Timken-bearing-equipped. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.*

How **THE CROSS CO.** mounts 148 drill spindles of its Transfermatic on Timken bearings to give longer bearing life, maintain accuracy.



This symbol on a product means its bearings are the best.

WHEN YOU BUY TIMKEN BEARINGS YOU GET...

1. Quality you can take for granted
2. Service you can't get anywhere else
3. The best-known name in bearings
4. Pace setter in lower bearing costs

BETTER-NESS rolls on

TIMKEN®

tapered roller bearings

First in bearings for 60 years

For more facts circle 448 on READER SERVICE CARD